Non-Prior Service Reserve Enlistments

Supply Estimates and Forecasts

Hong W. Tan

RAND | NATIONAL DEFENSE RESEARCH INSTITUTE

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ERRATA

Hong W. Tan, *Non-Prior Service Reserve Enlistments: Supply Estimates and Forecasts*, R-3786-FMP/RA, 1991.

P. 38 The last line is missing. It should read "only in assessing the relative importance of alternative recruiter".... The entire sentence should read: "We emphasize that these different forecasts are intended purely to be illustrative of major enlistment trends, and useful only in assessing the relative importance of alternative recruiter and economic assumptions."

p. 45 The lower panel of Fig. 3 is incorrect. The corrected figure is shown below.

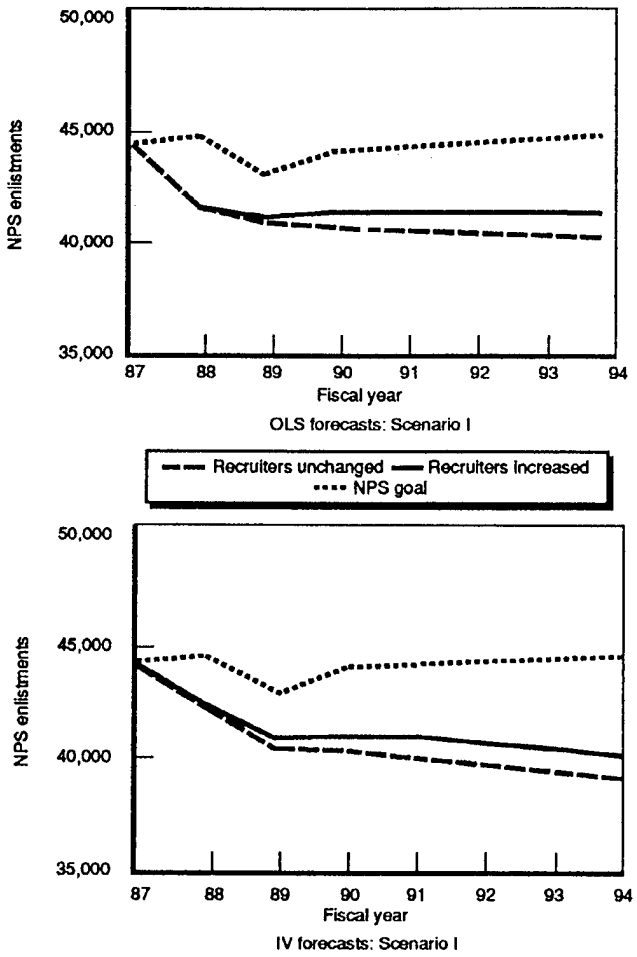

Fig. 3—Army National Guard forecasts: Scenario I

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PREFACE

The research described in this report seeks to provide Department of Defense (DoD) policymakers with better information regarding the effects of demographic and macroeconomic variables and policy instruments, such as recruiting resources and relative military pay, on the supply of non-prior service (NPS) reserve personnel. A data base was developed to estimate the effects of reserve recruiters, goals, relative military and civilian pay, the qualified youth population available to enlist in the military, and local unemployment rates on NPS enlistments in three Selected Reserve components: Army Reserve, Army National Guard, and Naval Reserve. The effects of competition for NPS recruits—both among reserve components and between the active and reserve components—were also investigated. Forecasts of NPS reserve enlistments were developed to assess the attainability of NPS projected goals under alternative economic scenarios.

This reserve supply research was jointly sponsored by the Assistant Secretary of Defense for Force Management and Personnel and by the Assistant Secretary of Defense for Reserve Affairs. Research was conducted within the National Defense Research Institute, a federally funded research and development center at The RAND Corporation supported by the Office of the Secretary of Defense and the Joint Chiefs of Staff. It was conducted by the project on Forecasting NPS Reserve Enlistments, part of RAND's Defense Manpower Research Center.

SUMMARY

Enlisted supply studies of the Selected Reserve have lagged behind research on the active components. In large part because of the paucity and relatively poor quality of reserve data, the findings of many earlier reserve studies have been of limited usefulness to Department of Defense (DoD) policymakers. Perforce, in manpower planning, policymakers have often relied on supply elasticities estimated for the active components despite questions about their applicability to the Selected Reserve (DoD, 1985).

This study takes a first step in addressing some of the DoD policy needs for enlisted supply estimates relevant to the Selected Reserve. One part of the effort involved data cleaning and imputation for missing data in the Reserve Components Common Personnel Data System (RCCPDS), collection of information on recruiters and goals, and development of a local labor market data base. For the purposes of the study, a common definition of the local labor market—the Military Enlistment Processing Station or MEPS—was adopted for all reserve components. Using these MEPSs-based data, non-prior service (NPS) enlisted supply models were estimated for three components: Army Reserve, Army National Guard, and Naval Reserve. The models sought to account for the effects of recruiter behavior and the potential impact of intercomponent competition for NPS recruits. Finally, estimated model parameters were used to develop forecasts of non-prior service enlistments to 1994 over alternative economic scenarios.

Many of the supply elasticities estimated for the Selected Reserve resembled those found for the active duty components.[1] Different supply effects might have been expected given the local labor market orientation of the reserves. Nonetheless, differences were found across the three reserve components studied. For example, we found reserve recruiter elasticities of between 0.4 to 1.0, with smaller effects estimated for the Naval Reserve's Sea and Air Mariner (SAM) program and larger effects for the Army Reserve. The youth population elasticity varied from component

[1]The supply elasticity of a given variable is the percentage change in the number of enlistments for a one percent change in that variable.

to component—from a high of 0.8 for the Naval Reserve to a low of 0.2 for the Army Reserve. A perverse negative youth population elasticity was found for the Army National Guard, possibly reflecting a more decentralized (state-based) allocation of guard units and recruiting resources or, more plausibly, our use of too aggregated a measure of population size as a proxy for the local labor market. Unemployment elasticities fell within a fairly narrow band of between 0.25 and 0.45. Finally, like many enlisted studies, we got mixed elasticities for relative military to civilian pay in the simple reduced form models; however, positive relative pay effects were found when more fully specified supply models were estimated.

Supply models incorporating the effects of recruiter behavior were estimated using information on recruiting goals. These models sought to control for the allocation of recruiter effort between NPS and prior service (PS) missions. For the Army Reserve, a negative tradeoff of between three to four PS enlistments for one NPS enlistment was found. The corresponding tradeoff for high quality NPS males was about five to one, suggesting that they are on average about five times more difficult to recruit as PS enlistees. For reasons that remain unclear, the tradeoff was estimated to be positive for the Army National Guard and the Naval Reserve. Nonetheless, models controlling for the diversion of effort to PS recruiting generally yielded larger estimates of NPS recruiter elasticities, as predicted.

An effort was also made to estimate the potential effects of competition on a reserve component's NPS recruiting. Two (simple) competition measures were included: one reflecting NPS male enlistments into the active components, and the other NPS enlistments into all other reserve components combined. In general, no deleterious effects of increased NPS recruiting by other active or reserve components on a given reserve component's recruiting were found. Possibly, positive spillovers from joint-service advertising may offset any negative impact of drawing down the pool of potential recruits available to a given reserve component. The one exception was the Naval Reserve, where increased enlistments by other active and reserve components had a large negative impact on SAM recruiting, especially of high quality NPS males. Other things equal, one fewer high quality male SAM was recruited for every 72 enlisted DoD-wide by the active components and for every 32 enlisted by other reserve components combined. Part of the explanation for these estimated

competition effects may lie in the rapid expansion of the SAM program at a time of falling unemployment and tight labor markets.

In the final section of the study, estimated supply parameters were used to forecast NPS reserve enlistments for the years between fiscal years (FY) 1987 and 1994. Negative population elasticities for the Army National Guard were replaced with those estimated for the Army Reserve. The predictive ability of the supply models was evaluated by comparing forecasts with actual NPS enlistments reported to DoD in FY 1987. The forecasts tend to overpredict FY 1987 NPS enlistments for the two Army reserve components, and slightly underpredict Naval Reserve NPS enlistments.

The forecasts beyond FY 1987 were used to assess the attainability of NPS enlistment goals under different economic scenarios and assumptions about growth of the recruiting force and PS goals. In one scenario, unemployment and relative pay were assumed to remain at current low levels over the forecast period. A second, more recessionary, scenario incorporated the wage effects of shrinking youth cohort size and a two percentage point rise in unemployment (from 5.5 to 7.5 percent) over the forecast period. Holding recruiter numbers fixed at FY 1986 levels, the first scenario forecasted falling enlistment rates because of the shrinking youth pool; these population effects were completely offset in the two Army components by rising unemployment rates assumed in the second scenario. Army Reserve NPS goals, and in particular the large rise in NPS enlisted requirements after FY 1990, do not appear attainable under the first scenario, even with a significant expansion of the recruiter force proportional to growth in enlistment goals. Only under the recessionary scenario are NPS goals attainable. For the Army National Guard, NPS enlistments are also forecasted not to make goals under the first scenario. Only under the more recessionary scenario are NPS goals attained after FY 1990. In the Naval Reserve, forecasts based on a proportionate (to goals) reduction in SAM recruiters suggest that recruiting for the SAM program is likely to be demand-constrained into the forseeable future.

ACKNOWLEDGMENTS

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The research was made possible by contributions from numerous people. Special thanks go to Mr. Lou Pales and Ms. Ginger Bassett of the Defense Manpower Data Center—Ginger Bassett, in particular, was instrumental in developing the reserve enlistment data base. Individuals in reserve recruiting commands who briefed us on institutional details and provided data on recruiters and goals included Colonel Henry Brummet and Major Eugene Matysek (U.S. Army Recruiting Command), Major Frederick Reinero (Air Force Reserve), and Lieutenant Colonel Alan Baxter and Major Scott Lund (Army National Guard). Drs. Jean Fletcher and Peter Kostiuk of the Center for Naval Analyses were instrumental in making possible our analysis of the Naval Reserve's Sea and Air Mariner program.

RAND colleagues Glenn Gotz, James Hosek, James Dertouzos, Christine Peterson, William Rogers, and Beth Asch commented on an early draft. Susan Hosek's close reading of a recent draft did much to improve the present form of this report, as did the comments of RAND reviewers Beth Asch and Sheila Kirby. The herculean task of cleaning, checking, assembling, and processing the many data elements from many different sources fell on Sally Carson's shoulders—her imaginative and expert programming skills made the analyses reported here possible.

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I. INTRODUCTION

Over the past decade, the Selected Reserve has sought to attract increasingly larger numbers of non-prior service (NPS) youth, especially high school graduates and those with high aptitude scores on the Armed Forces Qualification Test (AFQT). In the years ahead, several potential problems may arise in increasing the numbers of these high quality NPS reserve enlistments. First, the Selected Reserve will have to recruit from a shrinking pool of those eligible for the military as smaller post-baby-boom youth cohorts enter the labor market in the 1990s. Further, youth wages are likely to rise in the future as fewer numbers of youth compete for civilian jobs (Tan and Ward, 1985). Continued economic expansion since 1983, and the associated improvement in civilian job opportunities, may also make reserve enlistment less attractive to youth. Finally, the Selected Reserve will have to attract high quality NPS recruits at a time when the active duty services are competing to recruit a higher quality mix of youth.

In such an environment, Department of Defense (DoD) policymakers will need better information on the supply effects of demographic and aggregate economic changes and of policy instruments such as recruiting resources and military pay. Military supply research provides little guidance for reserve accession policy. Good estimates of recruiter and pay elasticities exist for active duty enlisted supply, but these are of questionable applicability to the Selected Reserve because of the part-time or "moonlighting" character of reserve jobs. The few extant reserve supply studies are also of limited usefulness.[1] With some recent exceptions (notably Kostiuk and Grogan, 1987), most earlier research is limited by several problems—the level of data aggregation, inadequate attention to local labor markets, and a paucity of data on reserve recruiters and recruiting goals that active duty enlistment studies have shown to be important (Dertouzos, 1985). Finally, reserve supply studies to date have not addressed the issue of intercomponent competition for recruits (Daula and Smith, 1985). To the extent that reserve and active

[1]Examples of earlier research on reserve supply include Rostker and Shishko (1973); and McNaught and Francisco (1981). A critical review of these reserve supply studies is found in Borak, Mehay, and Thomas (1985).

duty components draw from the same NPS youth pool, reserve enlistments may be affected by recruiting resources expended not only by other reserve components, but by other active branches of the armed forces as well.

The paucity of reliable reserve data has probably been the single major constraint on reserve supply research. The Reserve Components Common Personnel Data System (RCCPDS) is the official DoD source for reserve accession figures. Although its coverage and accuracy have improved over time, nonreporting of important educational, AFQT, and locational information poses problems in developing consistent cross-sectional time-series data bases needed to estimate aggregate supply models. Reserve supply research has also been limited by the availability of data on reserve recruiters and recruiting goals. These data, the historical series in particular, are not collected on a systematic basis by the reserve components, are not centralized, and are often not in machine-readable form. Compared to active duty supply research, a significantly greater investment by analysts—in cleaning, collecting, and coding reserve data—is required to study enlisted supply in the Selected Reserve.

This report describes a data collection and modeling effort designed to begin addressing some of these DoD policy concerns. The research has four main objectives:

- Develop a comprehensive data base to address the issues that arise in studying NPS reserve enlisted supply.
- Estimate the effects of reserve recruiters; goals; relative military and civilian pay; the qualified, military-available (QMA) youth population; and local unemployment rates on NPS reserve enlistments.
- Investigate the potential impact of competition for NPS recruits, both among reserve components and between the active duty and reserve components.
- Develop forecasts of NPS reserve enlistments to fiscal year (FY) 1994 under several alternative economic scenarios.

The remainder of the report comprises four major sections. Section II discusses the research issues that arise in estimating reserve enlisted supply models and the methodological approach used to address these issues. Section III describes the data and provides an overview of trends in NPS reserve enlistments, recruiters, and local labor market characteristics over the FY 1981–1986 period. Only the three largest reserve components (in terms of NPS missions)—Army Reserve, Army National Guard,

and the Naval Reserve's Sea and Air Mariner (SAM) Program—are considered.[2] The SAM program, which was initiated in FY 1984, is the Naval Reserve's primary vehicle for enlisting non-prior service recruits. Section IV discusses the empirical findings of estimating enlisted supply models, including efforts to account for the effects of recruiter behavior and intercomponent competition for NPS recruits. In Section V, illustrative forecasts of NPS enlistments between FY 1987 and FY 1994 are made over several alternative economic scenarios. The report concludes with a summary of the main findings and some implications for reserve accession policy.

[2]Data were also developed for the Air Force Reserve and the Air National Guard, but data limitations and the demand-constrained recruiting environment in these components precluded their inclusion in the analyses. However, data on enlistments in these Air Force components are used in estimates of intercomponent competition.

II. RESEARCH ISSUES

In this section, we provide an overview of research issues that arise in studying non-prior service enlistments in the Selected Reserve: (1) reserve recruiting in a moonlighting labor market, (2) the effects of recruiter behavior on enlistments, and (3) intercomponent competition for NPS recruits. This discussion is used to motivate the modeling approach adopted in Sec. IV and to describe the hypotheses to be explored.

To begin, consider the reduced-form supply models typically used in earlier studies of military enlistments:

$$\log(E) = \alpha_1 \log(R) + \alpha_2 \log(X) + \log(\varepsilon_1) \qquad (1)$$

that include (in logarithmic form) the number of enlistments E, the number of production recruiters R, and an X vector of variables such as the unemployment rate, youth population size, and relative military to civilian pay, plus an error term ε.[1] Most studies have relied on this double logarithmic model specification since the estimated α_i parameters are readily interpreted as supply elasticities—the percentage change in enlistments for a given one percent change in variable X_i. This reduced-form supply model can be expanded to address several substantive issues.

RESERVE RECRUITING AND MOONLIGHTING

The first issue concerns the differences between the reserve and active duty recruiting environment. Unlike the active components that draw from the national labor market, the Selected Reserve must man reserve units with recruits from the local labor market. For most reserve components, the relevant labor market is the population residing within a 50–100 mile circumference around the reserve unit.[2] A second unique feature is that serving in the reserves is usually not an individual's primary job.

[1]Some studies have also used an intensive specification with enlistment rates (relative to youth population size) as the dependent variable (for example, see Cotterman, 1986).

[2]In studies to support Army Reserve recruiting, market areas are defined even more narrowly—as the 17–29 year old male population residing within 35 miles of each reserve center.

Evidence that about three-quarters of reservists were holding full-time jobs means that, unlike the active duty, enlisting in the Selected Reserve involves a decision to "moonlight" (Burright, Grissmer, and Doering, 1982).

Both features of the Selected Reserve highlight the importance of defining the appropriate local labor market and controlling for local labor market attributes that influence the propensity to moonlight. This is not to suggest that geographic differences in enlistment propensity are unimportant in active duty recruiting. They are, and previous enlisted supply studies have sought to incorporate them through fixed-effects models (Daula and Smith, 1985; Kostiuk and Grogan, 1987), or models with state-specific error structures (Cotterman, 1986). However, these approaches reveal little about the nature of the unmeasured effects and, furthermore, implicitly assume that they remain fixed over time. An alternative approach is to include in the X vector of Eq. (1) a variety of local labor market variables thought to affect the moonlighting decision.

Several determinants of the reserve enlistment decision are suggested by the moonlighting model of Rostker and Shishko (1973). In that model, the enlistment decision is viewed as determined by the tangency of the individual's income-leisure tradeoff and his budget line, which has different wage rates and hours for primary and moonlighting jobs. When the point of tangency is located on the secondary-job segment of the budget line, the individual moonlights; otherwise, he works full-time on the primary job. This point of tangency is likely to depend on a number of economic factors: relative pay in the civilian sector and in the Selected Reserve, hours of work in the primary job, family resources, and the availability of alternative moonlighting opportunities. Other things equal, the theory would predict a greater likelihood of reserve enlistment in local labor markets where the civilian wage rate is low and reserve pay relatively high, and a lower likelihood of enlistment in labor markets where family income is high or where long hours and overtime in the primary job pose a constraint on moonlighting.[3]

[3]In a study of Army National Guard reenlistments, Burright, Grissmer, and Doering (1982) found micro-evidence consistent with the predictions of this moonlighting model. They found that higher wages and longer hours of work in the civilian job are associated with a lower probability of reenlistment (continued moonlighting); higher reserve pay, on the other hand, increases the likelihood of reserve reenlistment.

A lower propensity to take a reserve job might also be expected in large, urban labor markets where alternative civilian moonlighting opportunities may be more abundant.

RECRUITER BEHAVIOR

The second issue—the behavior of recruiters—is potentially more problematic for efforts to estimate the underlying enlisted supply parameters. Several recent Army enlisted supply studies have pointed out that simple reduced-form models such as Eq. (1) obscure the potentially important role of recruiter behavior in supply models (for example, see Dertouzos, 1985; Polich, Dertouzos, and Press, 1986; and Daula and Smith, 1985). This line of research suggests that recruiters may respond to quotas (or goals) by changing both the direction and intensity of their recruiting efforts among different categories of enlistments. These recruiter effects are likely to bias the estimated supply parameters and yield potentially unreliable forecasts, especially if recruiter goals change dramatically in the future.

Dertouzos (1985) provides the most succinct exposition of this analytic approach. There are three main features in his model. First, there is a production possibilities curve, representing the feasible combinations of (say) high quality and low quality recruits a recruiter can achieve, other things equal. This tradeoff arises because it takes time to process recruits, even a walk-in, so that increased recruiting of one category of enlistees diverts time away from recruiting other groups. Second, this tradeoff curve is shifted out or in by changing economic conditions (for example, unemployment rates), so larger or smaller numbers of both recruit categories are attainable with constant recruiter effort. Finally, he considers a model where a recruiting command's objectives are to attain total volume mission (combined high and low quality) and maximize the number of high quality recruits. The numbers and quality mix actually recruited depend (in complex ways) on the interaction of all three parts of this model. Specifically, Dertouzos demonstrates that changes in economic conditions and recruiting goals can lead to large swings in the number of high quality enlistments.

These insights have several implications for our reserve supply models. The most important implication is that the number of NPS reserve enlistments will depend not only on NPS goals, but also upon the goals for other categories of enlistments such as

females and prior-service recruits. Because the Selected Reserve also has a large prior-service (PS) mission, the diversion of recruiter effort to PS enlistments will be particularly important and should be incorporated explicitly in our NPS supply estimates.[4] This means that supply models such as Eq. (1) would tend to yield biased estimates of the supply parameters of interest as a result of recruiter behavior. Furthermore, simply including the number of other enlisted categories that compete for a recruiter's time in Eq. (1) results in simultaneous equation bias, since both enlisted categories are jointly determined.

Dertouzos addresses this simultaneity issue by including the number of PS enlistments in an expanded supply model (Eq. (2)), and jointly estimating this equation with a reduced-form expression (Eq. (3)) that accounts for recruiter objectives as measured by PS and NPS recruiting goals. Thus,

$$\log(E) = \alpha_1 \log(R) + \alpha_2 \log(X) + \alpha_3 \log(P) + \varepsilon_2 \qquad (2)$$

$$\log(P) = \beta_1 \log(R) + \beta_2 \log(X) + \beta_3 \log(Q_e) + \beta_4 \log(Q_p) + \varepsilon_3 \qquad (3)$$

where P is the number of PS enlistments, and Q_e and Q_p refer to NPS and PS enlistment goals, respectively. The PS parameter in Eq. (2), α_3, is interpreted in this model as an estimate of the relative difficulty of attracting PS versus NPS recruits. In general, we might expect the sign of this tradeoff parameter to be negative. More importantly, this modeling approach yields unbiased estimates of the α supply parameters of interest.

An alternative (and equivalent) approach is to estimate Eq. (2) by instrumental variables (IV) methods. Briefly, the IV approach involves replacing the endogenous variable P in Eq. (2) with its fitted value calculated from an auxilliary regression of P on all exogenous variables in Eqs. (2) and (3). PS and NPS goals, which are assumed to be determined outside the model, are used to identify this system of equations. The IV approach is used in Sec. IV to account for the effects of recruiter behavior and intercomponent competition, which is discussed next.

[4]With few exceptions (Kostiuk, 1987), previous reserve studies have not accounted for the demand-side effects of recruiters and goals on reserve enlistments, in large part because of the paucity of goal data needed to identify these models. Typically, separate supply models are estimated for NPS and PS enlistments.

INTERCOMPONENT COMPETITION

One final issue is that of intercomponent competition. Simply, the question is whether a reserve component's NPS recruiting is hampered or facilitated by competition from other components, both active duty and reserve. Given a finite youth pool in a local labor market, increased enlistments by other components might be expected to reduce the number available to be recruited. On the other hand, the increased presence of recruiters from other components may have a salutary impact (positive externalities) on a reserve component's recruiting. For example, one component's efforts to recruit from high schools indirectly benefit other components by making students more aware of pay and educational benefits, and thus more likely to enlist. Other potential spillovers include joint-service advertising and referrals (perhaps) from active recruiters in the same service. On balance, Daula and Smith (1985) find some evidence that increased DoD recruiting reduced high quality male enlistments into the active Army.

To date, there have been no published estimates of the enlistment effects of competition for youth among reserve components or, for that matter, of active duty/reserve competition. The impact of active duty-reserve competition will depend critically upon whether both components recruit from the same youth labor markets, or from distinct "full-time" versus "moonlighting" markets. If there is little overlap in the two markets, in other words, if youth do not perceive active duty enlistment and reserve enlistment as good substitutes, the impact of active/reserve competition on reserve enlistments should be minimal. The issue is of some policy interest, given recent efforts by the Selected Reserve to recruit high quality NPS males at a time when the active components are strenuously doing the same.

The issue of competition may be addressed by including measures of NPS enlistments by other components in an expanded supply model for each reserve component. Competition in the Military Enlistment Processing Station (MEPS) from active duty components is proxied by the number of male NPS active duty enlistments; the corresponding measure of reserve competition is the total number of NPS reserve enlistments, net of a given reserve component's own NPS recruits. Such a model, which might incorporate recruiter behavior as well, is represented

by an expanded Eq. (2′):

$$\log(E) = \alpha_1\log(R) + \alpha_2\log(X) + \alpha_3\log(P) + \alpha_4\log(A) + \alpha_5\log(O) + \log(\varepsilon_2) \qquad (2')$$

where PS enlistments P, active components' NPS enlistments A, and NPS enlistments by all other reserve components O, are all treated as endogenous variables. As before, NPS and PS goals are used to identify P. The measures of intercomponent competition, A and O, are identified by the number of active duty and other reserve recruiters in the MEPS, respectively.[5]

The parameters $\alpha 4$ and $\alpha 5$ in the expanded supply model reflect the net effects of intercomponent competition from the active duty and from other reserve components. The signs and magnitude of these parameters cannot be predicted *priori*. They will depend upon which effects dominate: competition (which hurts enlistments) or spillovers (which benefit enlistments). Comparisons of the size of $\alpha 4$ and $\alpha 5$ should also yield insights into the relative importance of competition from these two sources. In general, one might expect $\alpha 5$ to be greater than $\alpha 4$ if reserve components are more substitutable for each other than for active components. This might arise if, as noted earlier, "tastes" differ among potential NPS recruits: some may seek full-time employment in the active components; others only seek to moonlight. The latter group may be relatively indifferent about joining different reserve components, but may prefer reserve enlistment to full-time commitment in the active components.

To summarize, we have noted several issues likely to be important in estimating enlisted supply models for the Selected Reserve. First, the unique features of the Selected Reserve—moonlighting and localized recruiting—highlight the importance of controlling for characteristics of the local labor market. Second, NPS enlisted supply models cannot be estimated independently of other enlistment categories—recruiters may respond to goals by changing both the direction and intensity of their efforts among NPS and PS recruits. Third, a reserve

[5]For active duty components, this is the total number of Army, Navy, Air Force, and Marine Corps recruiters in the MEPS. For the Selected Reserve, this is approximated by the number of Army Reserve, Army National Guard, Naval Reserve, Air Reserve, and the Air National Guard recruiters in the MEPS, net of recruiters from the component being studied.

component's ability to attract NPS recruits will depend upon the extent of intercomponent competition, from both active duty and other reserve components.

III. DATA AND OVERVIEW OF TRENDS

With the discussion of modeling issues and hypotheses as background, we now turn to the data. First, we describe the main features of the analysis data base and how variables were created (interested readers are referred to App. A for details). We also highlight several data limitations that will have an impact on the empirical specification of supply models to be estimated in Sec. IV. We conclude with an overview of aggregate trends in NPS reserve enlistments, recruiters, and the local labor market over the FY 1981–1986 period.

DATA

The unit of analysis in our data is the geographic area served by the Military Entrance Processing Station. Active duty and reserve recruits entering military service are processed through 65 MEPSs which, together, serve the continental United States and Hawaii. Ideally, we would have preferred using a local labor market definition more relevant to recruiters—one within a hundred mile radius of the reserve unit. An alternative approach—using counties as the unit of observation—was judged to be impractical for this study because of sample size constraints.[1] More importantly, paucity of information on recruiters, recruiting goals, and local labor market variables at the sub-MEPS level would have precluded any consideration of the issues discussed in Sec. II.

For each reserve component, quarterly information by MEPS is available for the period between FY 1981–1986. The analysis will focus on three reserve components—the Army Reserve, Army National Guard, and Naval Reserve—although data were also developed for the Air Reserve and the Air National Guard.[2] Severe missing data problems, especially in the early years of the sample period, precluded consideration of the Marine Corps

[1]This is the approach adopted by Borak, Mehay, and Thomas (1985) in their study of Army Reserve enlisted supply. However, because of sample size and data constraints, their analyses are restricted to simple supply models estimated for one cross section in time.

[2]Information on NPS enlistments and numbers of recruiters in the latter two components are incorporated into our measures of competition.

Reserve.[3] This information is of two types. The first type refers to military personnel and includes information on the number of NPS and PS reserve enlistment contracts, NPS male enlistments in the active components, numbers of recruiters (for both active duty and reserve components), NPS and PS goals, and reserve pay. The second type includes a wealth of local labor market information on civilian youth wages, hours of work, family income, the size of the qualified, military-available (QMA) youth population, and local area unemployment rates. These variables and their definitions are described below.

Enlistments

The dependent variable in the enlisted supply model is the number of NPS reserve enlistment contracts by youth age 17 to 22 years.[4] This age restriction on NPS enlistments was motivated by several factors. First, we wanted to focus on junior enlisted personnel. As Grissmer, Buddin, and Kirby (1989) note, shortages of junior enlisted personnel constitute the primary numerical shortage in reserve manpower, especially in the Army Reserve and the Army National Guard. A second motivation was to develop a common definition for our measures of NPS enlistments and the QMA youth population. The algorithm developed to predict AFQT distributions in the QMA population pertains only to youth age 17 to 22, which necessitated a corresponding age restriction on the NPS enlistment variable. The age restriction means that our NPS enlistment totals will generally be lower than the enlistment counts reported by the Selected Reserve to the Department of Defense.

The enlistment data are available separately by sex, and by high quality and low quality recruits. High quality recruits satisfy two criteria: they are seniors and high-school graduates who receive a minimum Category III score on the Armed Forces Qualification Test. All other recruits are defined as being low quality. In the empirical analyses, we use two variants of the

[3]Miscoding problems were also present in the Naval Reserve's Sea and Air Mariner program and potentially precluded their inclusion in the study as well. Fortunately, a list of SAM recruits provided by the Center for Naval Analyses (CNA) allowed us to rectify these coding problems (see App. A).

[4]This age restriction means that our NPS enlistment counts are not directly comparable to official DoD figures on NPS enlistments.

dependent variable: the number of high quality NPS males, and the total number of male and female NPS recruits.

Recruiters and Recruiting Goals

Counts of numbers of production recruiters were assembled for each reserve component. Since data are reported by recruiting area specific to each component—states (Army National Guard), battalions (Army Reserve), and Naval Reserve Centers (NRC)—crosswalks between these different broad geographic areas and MEPS had to be developed at the level of the county (FIPS). These crosswalks were used to allocate recruiter figures across MEPS using FIPS-MEPS population weights derived from the 1980 Population Census. It should be noted that the Naval Reserve recruiter data potentially understate the number of recruiters devoted to enlisting Sea and Air Mariners.[5] Unlike the other reserve components, these recruiter figures were derived from Naval Reserve personnel records. They are counts of the number of recruiters credited with at least one enlistment in a given month; since recruiters are counted only if they enlist someone, some understatement is likely. However, there is no reason to believe that the understatement is systematically related to either MEPS or to years.

The data on recruiter goals are less complete. This will limit our ability to estimate supply models that account for recruiter behavior, since goals are used to identify models. It is not an issue for the Army Reserve where data on goals—by sex, NPS or PS, and recruit quality—are available for all years. For some of the other reserve components, detailed goal data span only the most recent years: FY 1984–1986 for the Naval Reserve and FY 1985–1986 for the Army National Guard. For these components, estimation of expanded models is limited to these years, with some efficiency loss due to small sample size.

Active and Reserve Competition

We will investigate the effects of two measures of competition in our reserve supply models. For each reserve component, we include a variable measuring the sum of NPS gains into each of

[5]The recruiter series for the Naval Reserve was developed by Kostiuk and Grogan (1987) of the Center for Naval Analyses.

the other reserve components in a given MEPS. As a measure of competition from the active duty components, we include a variable measuring the total number of active duty male NPS accessions in the MEPS area. When the dependent variable refers to high quality NPS reserve enlistments, the measures of competition are restricted to counts of high quality active duty or reserve enlistments.

The Qualified, Military-Available Youth Population

The QMA youth population in a MEPS area is the number of male youth age 17 to 22 years, without physical limitations, and with predicted test scores on the Armed Forces Qualification Tests that would place them in AFQT Categories I through IV. The last two criteria determine a potential recruit's eligibility to enlist in the Selected Reserve. Note that only males are included in this QMA population variable, even though some model specifications include both male and female NPS recruits in the dependent variable. This restriction should not be a serious limitation, given the relatively small number of female NPS enlistments. This youth population measure corresponds more closely to the definition of the QMA population than those typically used in supply research. Simple measures of youth population ignore variations in schooling attainment and AFQT test scores across local labor markets.

The QMA youth population variable used in this study was created in two steps (see App. A). First, a time-series on male youth was estimated by "aging" the 1980 Population Census over the study period. The projections assume that schooling continuation rates remain unchanged at 1980 levels; that existing age-specific mortality rates persist into the future; and that no dramatic regional shifts occur in youth migration patterns. In the second step, the AFQT distribution was imputed to the youth population series using parameters of a model estimated from the 1979 National Longitudinal Survey (NLS).[6] Those ineligible to enlist—with physical limitations or Category V AFQT test scores—are excluded from the QMA youth population. Both

[6]The NLS is a longitudinal survey of a random sample of youth age 17 to 22 years initiated in 1979. In 1980, a random sample of NLS youth was administered the Armed Services Vocational Aptitude Battery (ASVAB) in a survey jointly sponsored by the Department of Defense and the Department of Labor (Department of Defense, 1982), which made possible the AFQT imputation procedure.

educational attainment and predicted AFQT scores are used to define the high quality QMA population when the dependent variable is high quality NPS male enlistments.

Local Labor Market Characteristics

Several variables identified earlier as determinants of the moonlighting decision are used to characterize local labor market conditions. They include mean weekly hours worked, relative military to civilian pay, and family income denominated in 1986 dollars in the MEPS area. Other control variables include the proportion of youth living in Standard Metropolitan Statistical Areas (SMSAs, a measure of urbanization), local unemployment rates, and indicator variables for location in several broad census regions—the northeast, south, central (the omitted region), and west regions. The local labor market variables were developed from state-level information in two data sources: the March demographic file of the Current Population Survey (CPS), and the Bureau of Labor Statistics (BLS) publication, *Employment and Earnings*. MEPS-level weighted means were calculated using the state-MEPS crosswalks described earlier.

Some further discussion on measurement of local labor market conditions is warranted. Both data sources contain state-level information on unemployment rates, hours worked per week, and hourly earnings; both also have advantages and disadvantages. The BLS series are monthly estimates for production workers in manufacturing, with the advantage of being based on relatively large data samples. However, it is unclear whether these measures accurately reflect the labor market opportunities facing the youth population. In contrast, the CPS can be used to calculate age-specific labor market variables more relevant to the civilian youth population. Its drawbacks are no quarterly variation over the year (only annual averages can be calculated) and small sample size (with attendant measurement error). Measurement error is mitigated, to some extent, by smoothing the CPS series using a moving average process.

On balance, a judgment was made that the advantages of the CPS series outweighed its drawbacks, at least for some variables. Use of the BLS series relies importantly on the assumption of proportionality, namely, that youth labor market indices move in tandem with those of adult males in manufacturing (Cotterman, 1986). This assumption flies in the face of evidence that relative

to adults, youth wages have been depressed by the labor market entry of large baby-boom cohorts (Tan and Ward, 1985). It also precludes any consideration of rising relative wages with future declines in youth cohort size, an issue addressed in our forecasts in Sec. V. Indeed, using a more refined measure of cohort size, Lillard and Macunovich[7] find that rising youth wages since 1987 may have contributed to recent recruiting shortfalls; furthermore, they forecast sizable increases in youth wages in the 1990s. In light of these arguments, we use the CPS for estimates of youth hourly wages, weekly hours worked, and family income. For unemployment, we rely on the BLS figures as a measure of aggregate economic conditions; we justify this choice on the grounds of its wide use in policy circles, as well as its use in macroeconomic forecasts.

OVERVIEW OF TRENDS

Before turning to the empirical results in Sec. IV, it is useful to highlight the major trends in reserve enlistments, as well as changes in the civilian labor market that shape the reserve recruiting environment.

Table 1 reports total NPS and PS enlistments and numbers of recruiters for each of the three reserve components, as well as MEPS-level means of unemployment rates, the QMA youth population, and relative military to civilian hourly pay between FY 1981 and FY 1986. The broad enlistment trends in Table 1 generally accord with those reported in DoD publications (1985) and with unpublished DoD reserve enlistment figures. Levels differ, however, because the sample used in this study is restricted to NPS recruits age 17 to 22 years in the continental United States and Hawaii (excluding Puerto Rico).

It is clear that the Naval Reserve relies less on NPS enlistments to man reserve units than do the two Army reserve components. Since its inception, Sea and Air Mariner enlistments have been only 10 to 33 percent as large as the number of PS gains into the Naval Reserve. In contrast, the Army National Guard typically enlists more NPS than PS recruits, whereas the Army Reserve enlists about three-quarters as many NPS as PS recruits.

[7]Internal RAND paper on the changing economic structure and youth labor markets, 1988.

Table 1

SELECTED MILITARY AND CIVILIAN LABOR MARKET VARIABLES

Selected Variables		FY81	FY82	FY83	FY84	FY85	FY86
Enlistments							
Army Reserve	NPS	25,152	28,503	33,334	24,666	25,849	28,841
	PS	34,515	36,572	36,514	39,467	36,355	32,711
Army N. Guard	NPS	45,376	44,744	37,533	38,653	33,009	37,382
	PS	43,257	41,964	37,471	33,116	37,078	30,828
Naval Reserve	SAMs	0	0	1,976	8,564	7,688	5,974
	PS	22,154	25,609	24,210	19,909	19,283	19,479
Recruiters							
Army Reserve		1,082	1,133	1,146	1,149	1,400	1,491
Army N. Guard		1,471	1,593	1,588	1,875	2,286	2,363
Naval Reserve	(SAM)	0	0	157	525	753	953
Naval Reserve	(All)	1,245	1,245	1,418	1,869	1,858	2,337
Unemployment rate (%)		7.33	9.08	9.60	7.99	7.26	7.25
QMA population (1000s)		167.5	166.7	163.9	159.2	154.8	150.7
Reserve/civilian pay		.99	.97	1.01	1.07	1.08	1.12

NOTES: Non-prior service counts refer to the sample of recruits age 17 to 22 years, and are lower than figures reported to the services. SAM counts are incomplete in the fourth quarter of FY 1986. Civilian labor market variables are unweighted MEPS means. Other variables without apparent time trends include SMSA residence (0.7), family income ($32,000), and weekly hours (about 32 hours).

In absolute terms, the number of Naval Reserve NPS enlistments is quite small (between 2000 and 9000 recruits in our data) as compared to either the Army Reserve (about 30,000 recruits) or the Army National Guard (about 45,000 recruits).

The sample period may be divided broadly into two periods—FY 1981–FY 1983, and FY 1984–FY 1986. The period between FY 1981 and FY 1983 were years of rising unemployment, and a rise in both NPS and PS enlistments is observed in the Army Reserve. Compared to the post-FY 1983 period, relatively high levels of PS enlistments also took place in the Naval Reserves. The Army National Guard was the exception, with generally lower enlistments in both NPS and PS categories over this period. This observation is consistent with the recruiting difficulties reported by the Army National Guard over the period.

The post-FY 1983 period is less readily characterized. Reserve components generally posted lower PS enlistment gains between FY 1984 and FY 1986, a trend that appears to have been associated, at least in part, with the expansion of the economy and the improvement in civilian job opportunities. Over this period, unemployment rates declined from the high levels prevailing in FY 1983—9.6 percent in our data—to 7.2 percent by FY 1986. The NPS enlistment trends, however, are more mixed—rising for the Army Reserve, about even for the Army National Guard, and (possibly) falling for the Naval Reserve's SAM program. SAM enlistment figures should be treated with some caution, given incomplete enlistment data in the fourth quarter of FY 1986.

This mixed NPS enlistment picture was probably attributable to several factors. First, all three reserve components expanded the size of their recruiter force—from 1149 to 1491 recruiters for the Army Reserve, from 1875 to 2363 recruiters for the Army National Guard, and from 525 to 953 recruiters for the Naval Reserve's SAM program. Second, relative reserve to civilian pay rose from 1.01 in FY 1983 to 1.12 in FY 1986. Increases in recruiting resources, coupled with these improvements in relative military pay, were probably responsible for part of the rebound in NPS enlistments in the Army Reserve (FY 1984–FY 1986) and in the Army National Guard (FY 1985–FY 1986). The enlistment effects of these policy instruments would probably have been larger were it not for a third factor—a shrinking youth pool. The QMA youth population not only fell over the entire period—from 167,000 to 151,000—but the rate of decline also apparently accelerated after FY 1983.

Finally, consistent with the model of recruiter behavior described earlier, there appears to be some evidence of a tradeoff between NPS and PS enlistments. In the Army Reserve, the FY 1984 decline in NPS gains was accompanied by a rise in PS enlistments in that year, and a subsequent fall in PS enlistments as NPS recruiting improved in FY 1985 and FY 1986. A similar pattern is observed in the Army Guard between FY 1984 and FY 1986, where PS and NPS enlistments appear to move in opposite directions. In the Naval Reserve, we see a marked rise in the number of NPS enlistments beginning in FY 1984 when the Sea and Air Mariner program was launched. Over this period, PS enlistments fell, suggesting that considerable recruiting resources were diverted from PS recruiting to the SAM program.

In FY 1988, the Naval Reserve reportedly reduced SAM requirements and reallocated more resources to PS recruiting.

IV. EMPIRICAL RESULTS

This section presents the results of estimating alternative supply models for two groups of NPS reserve enlistees—high quality males, and combined male and female NPS recruits—in each of the three reserve components studied. A double logarithmic specification is used. In such models, the estimated parameters are interpreted as elasticities, a metric that facilitates comparison with the large body of enlisted supply elasticities estimated for the active components (for example, see Goldberg, 1985). The reduced-form supply estimates are estimated by ordinary least squares (OLS) regression and are reported first. These are followed by supply estimates from models that incorporate the effects of recruiter demand and competition for NPS recruits. The expanded models are estimated using instrumental variables methods.

SIMPLE REDUCED-FORM SUPPLY ESTIMATES

Table 2 presents the reduced-form supply estimates for high quality NPS males and both NPS males and females combined, respectively. With the exception of the Naval Reserve, the sample period is from FY 1981 to 1986. For the Naval Reserve, estimation is restricted to the years between FY 1984 (when the Sea and Air Mariner program officially began) and the third quarter of FY 1986, the last quarter with reliable SAM enlistment counts.

The effects of recruiters on NPS enlistments are strongly positive for all reserve components, and are statistically significant at the one percent level. In the two Army components, the elasticity of NPS enlistments with respect to recruiters falls within the 0.7 to 1.0 range. These elasticities are not unlike those estimated for the active duty components where elasticities range from 0.49 to 1.1 (Goldberg, 1985). A relatively low recruiter elasticity of about 0.38 is found for the Naval Reserve's SAM program, or about half that estimated for the Army reserve components.

There are two potential explanations for low recruiter elasticities in the SAM program. First, measurement error in the SAM recruiter variable may have resulted in a large downward

Table 2

NPS RESERVE ENLISTED SUPPLY RESULTS:
OLS ESTIMATES

Explanatory Variables	NPS High Quality Male Enlistments			NPS Male and Female Enlistments		
	USAR (3.5466)	ARNG (4.2868)	USNR (2.3714)	USAR (4.3752)	ARNG (4.8067)	USNR (3.0153)
Constant	5.292[a]	-1.902	-15.227[a]	-3.717[a]	-3.609	-13.296[a]
QMA population	.000	-.259[a]	.834[a]	.211[a]	-.050	.757[a]
Unemployment rate	.293[a]	.444[a]	.212	.363[a]	.436[a]	.123
Recruiters	1.045[a]	.860[a]	.365[a]	.812[a]	.724[a]	.387[a]
Relative pay	.618[a]	-.349[a]	-.006	-.065	-.474[a]	-.049
Weekly hours	-.161	1.190[a]	1.25[b]	.764[a]	1.580[a]	.632
Family income	-.461[a]	.158	.252	-.023	.043	.405
SMSA residence	-.132[a]	-.066	-.042	-.183[a]	-.130[a]	-.013
South	-.267[a]	-.471[a]	.076	-.297[a]	-.394[a]	.028
Northeast	-.022	-.293[a]	-.135	-.010	-.085[b]	-.122
West	-.196[a]	-.629[a]	.280[a]	-.228[a]	-.426[a]	.302[a]
R-square	.756	.518	.645	.818	.487	.685
Sample size	1560	1560	715	1560	1560	715
Time period	FY81–86	FY81–86	FY84–86(Q3)	FY81–86	FY81–86	FY84–86(Q3)

NOTES: Regressions include quarterly dummy variables. USAR = Army Reserve, ARNG = Army National Guard, USNR = Naval Reserve. Variables are in logs except for region and quarter indicator variables. Logarithmic mean of the dependent variable is in parentheses. The unemployment rate is based on the adult unemployment rate.

[a]Statistically significant at the 1 percent level.

[b]Statistically significant at the 5 percent level.

bias in its estimated effect. Recall that unlike the other reserve components, data on SAM recruiters were obtained through an indirect method (see App. A).[1] A second explanation may lie in the dramatic expansion of the SAM program, from NPS levels in earlier years of less than 2000 recruits, to an initial goal of 10,000 SAMs in FY 1984. Both the dramatic rise in NPS goals and a recruiter force relatively inexperienced in NPS recruiting may have contributed to diminishing returns to SAM recruiters. Some evidence suggestive of the second explanation is found when the model is reestimated including FY 1983; in that year, SAMs were recruited even before the official start of the Sea and Air Mariner program. The recruiter elasticities estimated over this more inclusive period—0.8—are twice as large, and more like those found for most of the other reserve components.

For the most part, NPS reserve enlistments are positively related to the size of the qualified military-available youth population. The youth population elasticity varies from component to component—from a high of 0.8 for the Naval Reserve to a low of 0.2 for the Army Reserve.[2] Again, these elasticities are comparable to those estimated for many of the active duty components. The exception is the Army National Guard, where a negative (and significant) population elasticity is found.[3]

The reasons for this "anomalous" result are unclear. We speculate that a contributing factor is the more decentralized (state-based) allocation of recruiter resources (or enlistment goals) in the Army National Guard. A more centralized system, cutting across state boundaries, would presumably result in a different allocation of recruiter resources (and goals) more related to youth population size. Indeed, scatter plots revealed a much more diffused relationship between population size and either NPS enlistments or assigned recruiters in the Army National Guard, as compared to other components. A second possible explanation is that our MEPS-level population figures are too geographically aggregated and do not accurately reflect

[1]Using the same data source, Kostiuk and Grogan (1987) find higher recruiter elasticities of 0.44 to 0.65 for the PS Naval Reserve. No comparable estimates are reported for the SAM program.

[2]This point ignores estimated coefficients that were not statistically significant in a t-test.

[3]Alternative model specifications were explored, including a weighted OLS run on samples restricted to those MEPSs with a significant reserve presence. However, negative population elasticities continued to be estimated for the Army National Guard.

changes (either across MEPS or over time) in the relevant local population where Guard units are located. Both factors, in concert, may explain the perverse population elasticity in the Army National Guard but not in the other components.

Military pay relative to civilian youth wages was hypothesized to have a positive effect on NPS enlistments. However, with the exception of the Army Reserve, estimated relative pay elasticities are of the wrong sign and, in many cases, are statistically significant. It has been suggested, based on reserve reenlistment research (and by implication enlistments), that reserve enlistments are less reponsive to take-home pay than are active duty reenlistments (Burright, Grissmer, and Doering, 1982). The importance of nonpecuniary factors in reserve enlistments may be one explanation for these findings. Another possible reason is that these are estimates from reduced-form models. As subsequent results indicate, significant and positive relative pay elasticities predicted by theory are usually found when more fully specified supply models are estimated.

Consistent with active supply research, high unemployment rates have a salutary impact on NPS enlistments in all reserve components. Point estimates of unemployment elasticities fall within a fairly narrow band between 0.25 and 0.45, and most parameters are statistically significant at the one percent level. For the Naval Reserve, a small positive elasticity is estimated, but it never attains statistical significance. On average, these estimates imply that a 10 percent rise in the unemployment rate is associated with a three to four percent increase in reserve enlistments. Like the recruiter elasticities noted above, these figures are fairly comparable to those estimated for the active components (0.26 to 1.23), where unemployment elasticities of 0.3 are most commonly found.

Several measures of local labor markets and geographic location were also included as control variables. One set of variables—weekly hours worked by youth, family income, and the proportion of the youth population living in SMSAs—were intended to measure differences in the propensity to "moonlight" across local labor markets. The mixed signs of their effects advise against such an interpretation; they are best viewed as simply being controls for unmeasured MEPS-specific effects on enlistments. They are also likely to be subject to a great deal of measurement error which, in general, would tend to bias their effects to zero. In general, NPS enlistments are lower in highly

urbanized local labor markets. Indicator variables, representing census regions, are usually statistically significant. Possibly reflecting the Naval Reserve's maritime orientation (and drill opportunities), Naval Reserve SAM enlistments are significantly higher in the west than in the central region.

THE EFFECTS OF RECRUITER DEMAND AND COMPETITION

A limitation of these OLS supply estimates is that no account is taken of recruiter demand or competition. First, as several active supply studies have demonstrated, high quality male enlistments are not determined independently of enlistments by other groups of youth. In the reserve components, recruiters also have a prior-service mission, and effort must be expended to recruit them as well as other categories of low quality males and females. Second, competition from other reserve and active components is assumed to have no impact on a reserve component's recruiting. Increased enlistments by other components might be expected to reduce the available pool of potential recruits. However, these negative effects may be mitigated, or even offset, by positive spillover effects from DoD-wide and joint advertising or referrals from other components.

Tables 3 through 5 present the results of models addressing these issues, estimated by instrumental variables (IV) methods. Two sets of estimates are reported. The first incorporates recruiter behavior by controlling for the number of prior service recruits, using NPS and PS goals as instrumental variables. For the high quality male sample in the Army Reserve, detailed goals data permitted estimation of an alternative model specification in which PS and other NPS enlistments are instrumented by their respective goals. The second set of estimates add proxy measures of active duty and reserve competition, measured by total DoD-wide active duty male NPS enlistments and by combined NPS enlistments into all other reserve components; their instruments are the corresponding total numbers of active duty and reserve recruiters.

Before turning to the results, it should be noted that Army Reserve results reported in Table 3 are based on a model specification that excludes quarterly dummy variables. In results not reported here, inclusion of quarterly dummy variables for the

Table 3

ARMY RESERVE
IV ESTIMATES WITH CONTROLS FOR RECRUITER DEMAND
AND THE EFFECTS OF COMPETITION

Explanatory Variable	High Quality Males (Mean = 3.5466)		NPS Males and Females (Mean = 4.3752)	
	(1)	(2)	(1)	(2)
Constant	2.313	-1.676	-7.330[a]	-9.049[a]
QMA population	.262[a]	.128	.458[a]	.479[a]
Unemployment rate	.339[a]	.299[a]	.422[a]	.403[a]
Recruiters	1.188[a]	.919[a]	.974[a]	.547[a]
Relative pay	.673[a]	.428[a]	-.021	-.021
Weekly hours	-.361	-.487	.857[a]	-.228
Family income	-.235[b]	.110	.162	.532[a]
SMSA residence	-.197[a]	-.071	-.248[a]	.017
South	-.098[a]	.019	-.252[a]	-.041
Northeast	-.038	.107[a]	-.018	.060
West	-.040	.053	-.166[a]	-.073
Other NPS recruits	.168[a]	.108[a]	—	—
PS recruits	-.567[a]	-.635[a]	-.403[a]	-.375[a]
Active competition	—	.222[a]	—	-.209[a]
Reserve competition	—	.485[a]	—	.776[a]
R-square	.729	.716	.747	.699
Sample size	1560	1560	1560	1560

NOTES: Regressions exclude quarterly dummy variables (see text). Logarithmic mean of the dependent variable is in parentheses. Sample period is FY 1981–FY 1986.

[a]Statistically significant at the 1 percent level.

[b]Statistically significant at the 5 percent level.

Army Reserve NPS sample had the effect of swamping recruiter effects; the recruiter elasticity was actually estimated as being negative, which is implausible. A close examination of the goals data revealed a systematic pattern of change in NPS and PS goals across quarters.[4] To the extent that recruiter effort is responsive

[4]These quarterly variations in goals are possibly related to the way in which the U.S. Army Recruiting Command (USAREC) uses computer models to set quarterly

Table 4

ARMY NATIONAL GUARD
IV ESTIMATES WITH CONTROLS FOR RECRUITER DEMAND
AND THE EFFECTS OF COMPETITION

Explanatory Variable	High Quality Males (Log mean = 4.2865)		NPS Males and Females (Log mean = 4.7274)	
	(1)	(2)	(1)	(2)
Constant	8.592[a]	12.897[a]	3.659	9.610[a]
QMA population	-.462[a]	-.852[a]	-.237[a]	-.813[a]
Unemployment rate	.468[a]	.194	.489[a]	.228[b]
Recruiters	.812[a]	.666[a]	.767[a]	.766[a]
Relative pay	.609[b]	.211	.909[a]	.523[b]
Weekly hours	-1.069[a]	-1.129[a]	-.476	-.459
Family income	-.037	-.217	.089	-.221
SMSA residence	.277[a]	.200[a]	.193[a]	.141[b]
South	-.457[a]	-.425[a]	-.256[a]	-.214[a]
Northeast	-.494[a]	-.380[a]	-.335[a]	-.209[a]
West	-.752[a]	-.727[a]	-.460[a]	-.425[a]
PS recruits	.374	.348	.272	.173
Active competition	—	.272	—	.585[b]
Reserve competition	—	.341[a]	—	.183
R-square	.713	.733	.742	.744
Sample size	520	520	520	520

NOTES: Regressions include quarterly dummy variables. Logarithmic mean of the dependent variable is in parentheses. Sample period is FY 1985–FY 1986.

[a]Statistically significant at the 1 percent level.

[b]Statistically significant at the 5 percent level.

to changes in quarterly goals, we would expect a high degree of correlation between enlistments, goals, and quarterly indicator variables. Not surprisingly, the model is unable to disentangle recruiter effects from supply-side changes over the year in enlistments that the quarterly indicator variables were intended to capture.[5] Quarterly dummy variables were retained in models

goals for the Army Reserve. In fact, our recruiter and goal figures are derived from the same USAREC data base used to set quarterly goals.

[5]Polich, Dertouzos, and Press (1986) also exclude monthly dummies from their model of high quality Army enlistments. Their justification appears to be for reasons of model identification.

or the other reserve components since their goals do not exhibit systematic quarterly variation. The Naval Reserve, in fact, appears to allocate annual recruiting goals evenly across quarters over the fiscal year (Kostiuk, 1987).

Estimates of the tradeoff between NPS and PS recruits are presented in specification (1) of Tables 3 through 5. The tradeoff parameter (coefficient of the PS variable) measures the difficulty of recruiting NPS as compared to PS enlistees. For the Army Reserve, this tradeoff is negative and significant, ranging between -0.5 and -0.6 for high quality males, and around -0.4 for

Table 5

NAVAL RESERVE SAM PROGRAM
IV ESTIMATES WITH CONTROLS FOR RECRUITER DEMAND
AND THE EFFECTS OF COMPETITION

Explanatory Variable	High Quality Males (Log mean = 2.3714)		NPS Males and Females (Log mean = 3.0153)	
	(1)	(2)	(1)	(2)
Constant	-9.837[a]	-8.337[a]	-9.046[a]	-8.532[b]
QMA population	.300[b]	.796[a]	.324[b]	.468[a]
Unemployment rate	.327[a]	.673[a]	.237[b]	.419[a]
Recruiters	.329[a]	.391[a]	.359[a]	.376[a]
Relative pay	-.073	.188	-.114	-.045
Weekly hours	1.425[a]	1.560[a]	.831	.979[b]
Family income	.042	-.143	.233	.170
SMSA residence	-.166	-.366[a]	-.139	-.244[a]
South	-.175	-.472[a]	-.114	-.286[a]
Northeast	-.144[b]	-.397[a]	-.129[b]	-.221[a]
West	-.073	-.523[a]	.039	-.197
PS recruits	.534[a]	.972[a]	.440[a]	.678[a]
Active competition	—	-.933[a]	—	-.314
Reserve competition	—	-.395[a]	—	-.229[a]
R-square	.666	.658	.710	.707
Sample size	715	715	715	715

NOTES: Regressions include quarterly dummy variables. Logarithmic mean of the dependent variable is in parentheses. Sample period is FY 1984–FY 1986(Q3).

[a]Statistically significant at the 1 percent level.

[b]Statistically significant at the 5 percent level.

all NPS recruits as a whole. These estimates indicate that a 10 percent increase in the number of PS enlistments is associated with a six percent decline in the number of high quality males, and about a four percent decline in NPS recruits in general. Evaluated at the mean values of PS and NPS enlistments, the tradeoff parameters suggest a tradeoff of over five PS enlistments for one high quality male NPS enlistment; the corresponding tradeoff of PS for all NPS combined is between three and four to one.[6] In specifications (2) and (3), enlistments of high quality males and other NPS recruits appear to move together in the Army Reserve.

Contrary to expectation, the estimated tradeoff parameters are positive in all samples of the Army National Guard and the Naval Reserve. However, they are statistically significant only for the Naval Reserve. One possible reason is that certain reserve recruiters are assigned only to recruiting SAMs, so no NPS-PS tradeoff effect might be expected.[7] Another possible explanation for the positive tradeoff result is spillovers (referrals and advertising) to the SAM program from increased PS recruiting. Alternatively, potential recruits may find the SAM program more attractive in those locations with a large Naval Reserve presence, which are also areas where PS recruiting is high.[8]

Compared with the OLS estimates, recruiter elasticities are larger when we control for the number of other enlistments that "compete" for a recruiter's time. This is perhaps not surprising since the OLS parameter reflects a total recruiter effect—adding a recruiter results in increased numbers of both NPS and PS enlistments. For the Army Reserve, recruiter elasticities for NPS recruits rise from 0.8 to almost 1.0; for the Army National Guard, a similar but smaller increase from 0.7 to 0.8 is found. In the case of the Naval Reserve, recruiter elasticities are generally

[6]In the active Army, a tradeoff of four low quality males to one high quality male has been estimated by Dertouzos, (1985), and Polich, Dertouzos, and Press (1986).

[7]Informed sources suggest that this may in fact have reflected the allocation of recruiting responsibilities in the early years of the SAM program. In specifications not reported here, the SAM model was reestimated with PS enlistments instrumented by the number of non-SAM reserve recruiters. The estimated results were virtually unchanged.

[8]Sea and Air Mariners in the early years of the program apparently had limited opportunities for training except in simulators. Reportedly, this may account for lower enlistment rates in the midwest; those with a Navy preference tended to enlist in the active component rather than in the SAM program.

unchanged when we control for the number of PS enlistments. This is consistent with earlier speculation that recruiters may specialize in either SAM or PS recruiting.

Several other differences are noteworthy. First, most relative pay elasticities switch signs and are now estimated to be positive. When negative pay elasticities are estimated, such as for the Naval Reserve's SAMs and the Army Reserve's NPS male and female recruits, they are not statistically significant at either the one or five percent level. Compared to the OLS estimates, these pay elasticities also rise, to between 0.5 and 0.8 for both the Army Reserve and the Army National Guard. Furthermore, pay effects in the Army National Guard that were negative in the OLS specification now switch signs and become positive. Second, unemployment effects continue to be important, and in the case of SAMs become statistically significant typically at the one percent level. Finally, for reasons that are unclear, the SMSA variable in the Army National Guard sample turns from negative to positive, and now becomes significant.

The final specification in Tables 3 through 5 is intended to capture the effects of competition for NPS recruits from other reserve and active components. These competition effects are summarized in Table 6 to facilitate comparison. Table 6 indicates that with one important exception—the Naval Reserve—we find little evidence of deleterious intercomponent competition on reserve recruiting, either from the active services or from other reserve components. For both the Army National Guard and the Army Reserve (for the most part), the estimated effects of competition are usually positive. In the Naval Reserve's SAM program, on the other hand, negative effects are found with three of the four parameters being significant. The effects of competition are most pronounced in the area of high quality male SAM recruiting. Evaluated at their respective means, an increase of 72 high quality male NPS active duty enlistments is associated with a shortfall of one high quality male SAM recruit. The corresponding tradeoff in recruiting by other reserve components combined and by the SAM program is 32 to 1. Compared with competition from the actives, it takes fewer NPS enlistments by other reserve components to displace one SAM recruit.

To what may we attribute these differences across components? For the Naval Reserve, part of the explanation is likely to lie in the rapid expansion of the SAM program from under 2000

Table 6

THE EFFECTS OF COMPETITION FOR NPS RECRUITS

Reserve Component	Source of Competition			
	From Active Components		From Reserve Components	
	Coefficient	Tradeoff	Coefficient	Tradeoff
Army Reserve				
HQ males	.222[a]	+	.485[a]	+
NPS total	-.209[a]	(1:53)	.776[a]	+
Army National Guard				
HQ males	[b]	n.a.	[b]	n.a.
NPS total	.585[c]	+	[b]	n.a.
Naval Reserve				
HQ SAM males	-.933[a]	(1:72)	-.395[a]	(1:32)
NPS total	[b]	n.a.	-.229[a]	(1:47)

NOTES: n.a. means not applicable because of [b]. HQ means high quality males (for definition, see text).

[a]Statistically significant at 1 percent level.

[b]Not statistically significant at 5 percent level.

[c]Statistically significant at 5 percent level.

annually to over 8000 recruits within a year, coupled with its inception at a time of falling unemployment and tight labor markets. In such an environment, the effects of competition from other active and reserve components were probably felt quite strongly. In the Army reserve components, spillover effects from the presence of other reserve and active components appear to have outweighed the negative effects of competition. But then, growth in NPS recruiting in these reserve components was also more moderate. These explanations are clearly speculative and will require further research.

SUMMARY

NPS enlisted supply estimates were presented for three Selected Reserve components. The estimated effects of the key economic and policy variables—youth population, numbers of recruiters, unemployment, and relative military to civilian pay—are

generally consistent with the predictions of theory. However, what is particularly striking about the reserve elasticities is their similarity to those estimated for the active components. Some evidence of intercomponent competition for NPS recruits was found in the Naval Reserve—perhaps as a consequence of the SAM program's rapid growth at a time of tightening labor markets—but not in the other reserve components.

We began this exercise with concerns about the quality and paucity of reserve data. Given the generally robust results reported above, we conclude that sensible supply models can be estimated for the reserve components using these data.

V. FORECASTING NPS RESERVE ENLISTMENTS

In this section, we develop national-level forecasts of NPS enlistments for the Army Reserve, the Army National Guard, and the Naval Reserve. The estimated parameters from the preceeding section are used to predict NPS enlistments on a fiscal year basis for the period between FY 1987 and FY 1994. Two sets of forecasts are presented, one based on the reduced-form model and the other based on a model incorporating the effects of recruiter demand. The predictive ability of these models is evaluated by comparing forecasts with actual NPS enlistments reported by the Selected Reserve in FY 1987. For the years beyond FY 1987, annual forecasts are compared to published enlisted personnel requirements to provide insights into whether, and under what economic circumstances, five-year reserve NPS goals are attainable.

FORECASTING METHODOLOGY

The methodology used to develop national-level forecasts of NPS reserve enlistments was shaped by three considerations. The first was the issue of aggregation, namely, using MEPS-level parameter estimates to forecast national NPS reserve enlistment figures. Enlisted supply models have a nonlinear logarithmic specification, and the estimated parameters cannot simply be multiplied by national-level aggregates of the explanatory variables. The sum of the logarithms of MEPS-level variables is not equal to the logarithm of the sum of these variables. MEPS-level projections of all explanatory variables must first be developed for every year over the forecast period; only then can the product of estimated parameters and logarithms of projected variables be aggregated to yield national-level forecasts.

The second issue involved reconciling level differences between our data series and aggregate enlisted figures reported to the Department of Defense by each reserve component. As noted in Sec. III, our data series understate the number of NPS enlistments because we restrict our analysis to the sample of recruits age 17 to 22 years. This age restriction excludes a small,

positive number of NPS recruits age 23 years and over. Our SAM enlistment counts come from a different source and differ from official Naval Reserve NPS figures. Finally, our PS enlistment counts are invariably lower than the official DoD figures, in large part because we exclude as suspect any PS counts resulting simply from movements between Individual Ready Reserve (IRR) and Selected Reserve (SR) status (see the discussion of the data in App. A). The PS level differences will matter in IV forecasts that take into account diversion of recruiter effort to PS enlistments.

Reconciliation of the two data series was accomplished by applying a component-specific expansion factor to the forecasts. This correction factor is the multiple by which our FY 1986 enlistments understate each reserve component's FY 1986 figures as reported in the 1988 DoD publication, *Military Manpower Requirements Report*.[1] Forecasts, corrected for these level differences, are then used to determine the extent to which the different models over or underpredict actual NPS enlistments reported in FY 1987.

A final (related) issue concerns forecasts for the years beyond FY 1987. To facilitate comparison with future NPS enlistment goals, forecasts are adjusted such that projected NPS gains in FY 1987 are the same as NPS enlistments reported in that year.[2] In effect, forecasts are adjusted by a (multiplicative) correction factor equal to the forecast error for the FY 1987 projections. Implicitly, these intercept adjustments assume that measurement error and systematic biases in the FY 1987 forecasts will persist into the future.

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[1]Expansion factors used for the NPS forecasts are 1.1685, 1.1851, and 1.0575 for the Army Reserve, Army National Guard, and Naval Reserve, respectively. These corrections are built directly into our reported forecasts. The corresponding adjustment factors for PS enlistments are 0.6059, 0.8007, and 0.9325, respectively, and are used only when IV forecasts are reported.

[2]In practice, many forecasting models are subjectively adjusted either using values other than zero for future error terms or using values other than the estimated values for model coefficients. Intriligator (1978, chap. 15) notes that if the recent features of the system are different from those over the entire sample and it is expected that these features will continue into the future, or if past residuals exhibit positive serial correlation, then it might be appropriate to use recent forecast errors to construct "add factors" or intercept adjustments. The literature also indicates that forecasts using such subjective adjustments have generally been more accurate than those obtained from the purely mechanical application of the econometric model (Fair, 1986).

FORECASTING ASSUMPTIONS

The forecasts are based upon a number of assumptions. For the most recent year—FY 1987—some of these variables are known and are incorporated into the forecasts. For the outyears beginning in FY 1988, the future path of all explanatory variables must be projected at the level of the MEPS. Each of the assumptions that underlie these projections is discussed below.

The Qualified, Military-Available Youth Pool

Projections of the QMA male youth population are based upon the 1980 Population Census and the same methodology used to generate the population figures used in our earlier analyses. The methodology is described in App. A. To summarize, it involved "aging" the 1980 Population Census to 1994, assuming time-invariant schooling continuation rates and persistence of current age-specific mortality rates. The figures are then used to project the future size of the high quality and total QMA youth populations. The QMA male youth population is projected to decline by about 1.4 million over the eight-year forecast period, from 9.6 million in FY 1987 to 8.2 million by FY 1994 (see Table B.1).

Theoretically, declining youth population size should have a negative impact on NPS enlistments. For the Army National Guard, the negative population elasticities estimated in Sec. IV would lead instead to forecasts of increased enlistments—which is not believable. We address this issue by simply substituting population elasticities estimated for the Army Reserve, as reported in Tables 2 and 3.[3] We take comfort in noting the narrow range in which the latter population elasticities vary—between 0.2 and 0.4—and their similarity to the elasticities estimated for the Naval Reserve.

[3]The multiplicative form of the enlistment model is sensitive to any modification of the estimated parameters, especially one as large as that contemplated here. In substituting the Army Reserve population parameters, an offsetting exponentiated constant was subtracted, in effect pegging the new Army National Guard enlistment forecasts to the initial FY 1987 first-quarter values that would have prevailed under the original model.

Aggregate Unemployment Rates

For the first two years, forecasts are based upon quarterly unemployment rate figures published in the Bureau of Labor Statistics *Monthly Labor Review*. These averaged 6.5 percent and 5.6 percent in FY 1987 and FY 1988. For the years beyond FY 1988, we use two alternative national-level unemployment forecasts. The first assumes that aggregate unemployment rates remain at FY 1988 fourth-quarter levels of 5.4 percent until year-end 1992, after which they rise marginally to 5.5 percent. This set of national unemployment rate projections is implicit in the FY 1989 federal budget estimates. The second is based on a mild economic slowdown, in which aggregate unemployment rates rise two percentage points from existing levels, to 7.5 percent by year-end 1994. In each scenario, aggregate unemployment rate changes are assumed to translate into a corresponding percentage rise or fall in local unemployment rates from levels prevailing in the MEPS in the fourth quarter of FY 1986.[4]

Relative Military to Civilian Pay

In the fourth quarter of FY 1986, we estimate that the hourly wages facing potential recruits were $4.80 and $5.33 for civilian and reserve jobs, respectively. We consider two alternative time paths for these pay figures. The first simply pegs real military and civilian youth pay at the 1986 levels; in other words, both wage series are assumed to rise at the same rate as inflation. In this scenario, relative military to civilian pay across MEPSs remains unchanged over time. The second set of projections seeks to incorporate the potential effects on relative pay of rising civilian wages brought about by smaller youth cohorts in the labor market (Tan and Ward, 1985). These projections, which are based on estimates by Lillard and Macunovich,[5] incorporate not only youth cohort-size wage effects but also the wage effects of aggregate unemployment rates. Thus, the future course of relative military pay in each MEPS depends on the size of youth cohorts in the local labor market, on assumptions about local unemployment rates, and on military pay (assumed constant in real dollar terms).

[4]We also experimented with, and rejected as impractical, alternative assumptions which would have permitted MEPS-specific unemployment cycles that are related nonlinearly to national unemployment rates.

[5]Internal RAND paper, 1988.

Production Recruiters

In the forecasts, we make two alternative assumptions about recruiters: first, the total number of recruiters (and their distribution across MEPSs) in each component remains unchanged at FY 1986 levels; second, the number of recruiters increases (roughly) in proportion to NPS and PS enlistment goals. The forecasts based on the first assumption—constant number of recruiters—provide a convenient benchmark against which the effects of other changes (such as economic scenario or numbers of recruiters) may be compared. The second assumption provides a sense of how attainable future enlistment goals are given "reasonable" increases in recruiter resources. Of particular interest is the large projected 8000 recruit increase in Army Reserve NPS goals—from 28,600 recruits in FY 1989 to 36,400 in 1990—coupled with a proposed 6300 reduction in PS goals (see Table B.2).

Several factors were taken into account in projecting recruiters for each reserve component. For the Army Reserve, projections reflect two factors. We incorporate the reported five percent increase in recruiters between FY 1987 and FY 1988; in subsequent years, projections reflect a weighted average of NPS and PS goals. As weights, we use the PS-NPS tradeoff of three to one estimated for this component in Sec. IV.[6] The Army National Guard reported no change in the number of recruiters in FY 1987 and FY 1988. In those two years, recruiter figures are held constant; in subsequent years, projections are a weighted average of PS and NPS goals using (as before) a three to one weighting scheme.

The recruiter projections are treated somewhat differently for the Naval Reserve. Although this component reported increases in the number of recruiters in the first two years of the forecast period (from 958 to 1056 recruiters), all of the increase probably went to PS recruiting rather than to SAM recruiting. This was the result of an institutional decision to reduce SAM recruiting goals in FY 1988, brought about by Navy concerns over the mismatch between a desired ratings mix and an annual recruiting goal of

[6]This weighting scheme reflects the relative difficulty of enlisting NPS versus PS recruits in projecting the number of recruiters required to meet stated NPS and PS goals. As such, it is probably a more meaningful measure than any other weighting scheme, including a simple average of NPS and PS goals that would assign too much weight to PS goals in determining recruiter needs.

10,000 SAMs. Reflecting this institutional decision, the number of SAM recruiters is tied instead to SAM goals and these decline over the forecast period.

Table B.3 lists the recruiter figures projected under these alternative assumptions.

Other Variables

All other variables are assumed to remain constant at levels prevailing in each MEPS during the fourth quarter of FY 1986. Given the mixed results for the weekly hours worked, real family income, and SMSA variables, it was judged advisable not to forecast these labor market variables and to simply treat them as fixed. This assumption is not particularly odious, given the relative stability of these variables over the 1981–1986 period.

FORECASTS

Non-prior service enlistments for each reserve component are forecasted for two alternative economic scenarios. Scenario I assumes constant relative military pay and unemployment rates that change little from present levels of about 5.4 percent. Scenario II considers a more recessionary economic environment in which unemployment rates rise to 7.5 percent by the end of the forecast period, with most of the rise in unemployment rates occurring between FY 1990 and 1992. This scenario also incorporates the wage effects of changing cohort size. However, these cohort-size wage effects are not fully felt until after FY 1992 because of the dampening effect of the (assumed) rise in unemployment rates.[7] From FY 1993 on, however, the rise in youth wages is dramatic—6.5 percent over a two-year period over and above inflation. As a result, relative military pay varies over the forecast period—dipping below FY 1986 levels in FY 1987 and FY 1988, rising above it until 1992, and declining continuously from then on (see Table B.1).

Four sets of forecasts are presented for each scenario. The first two are based on the simple reduced-form supply model ("OLS forecasts"). The OLS forecasts are made for each of the two

[7]Another contributing factor is a local trough (in FY 1990 through FY 1992) in the otherwise rising time pattern of cohort-size wage effects estimated by Lillard and Macunovich.

recruiter assumptions: (1) a constant number of recruiters, and (2) a "proportionate" rise in the number of recruiters. The last two sets of forecasts are based on the expanded model that incorporates recruiter demand effects ("IV forecasts"); as before, separate forecasts are developed for the two recruiter assumptions. Instrumental variables forecasts of NPS enlistments are predicated on the exact attainment of annual PS "goals" over the forecast period. This is not implausible since PS enlistees are relatively less difficult to recruit than NPS youth. For FY 1987, the number of PS recruits is known; in subsequent years, we assume that these "goals" are accurately reflected by PS enlisted requirements reported in the DoD's most recent five-year manpower plans, developed as part of the Program Objective Memorandum (POM). The NPS and PS requirements are reported in appendix Table B.2.

Forecasts for FY 1987

Table 7 compares the forecast enlistments with the actual enlistment figures reported for FY 1987 by the Selected Reserve. OLS and IV forecasts are based on Scenario I and on unchanged recruiter numbers (assumption 1). As is apparent from the table, some forecasts are fairly close to the realized enlistments; others did not do as well. OLS forecasts tend to overstate NPS enlistments in the two Army reserve components—by about six percent for the Army Reserve and by about 13 percent for the Army National Guard. The IV forecasts overstate Army Reserve NPS enlistments even more (by about 15 percent), but understate Army National Guard enlistments by four percent. For the Naval Reserve, our OLS and IV forecasts for SAM enlistments are within five percent of the NPS enlistments reported in FY 1987.

Forecasts for FY 1988 to FY 1994

Armed with these insights into the potential forecast errors for each reserve component, we turn to the longer-range forecasts for each of the three reserve components. Forecasts are adjusted so that predicted NPS enlistments equal reported NPS gains in FY 1987 (the unadjusted NPS forecasts are reported in Tables B.4 and B.5). We emphasize that these different forecasts are intended purely to be illustrative of major enlistment trends, and useful

Table 7

NPS RESERVE ENLISTMENTS IN FY 1987:
A COMPARISON OF REPORTED ENLISTMENTS AND FORECASTS

Reserve Component	FY 1987[a]		
	Reported Values	Forecast[b]	Difference Percent
OLS forecasts			
Army Reserve	31,800	33,839	6.4
Army National Guard	43,800	49,604	13.2
Naval Reserve	10,200	9,703	-4.9
IV forecasts			
Army Reserve	31,800	36,701	15.4
Army National Guard	43,800	42,066	-4.0
Naval Reserve	10,200	10,031	-1.7

[a]FY 1987 enlisted figures are from the Directorate for Accession Policy, DoD.
[b]Forecasts based on Scenario I assumptions.

and economic assumptions. Forecasts are based on supply elasticities that may be estimated with error, on our subjective judgments about the forecast error in FY 1987 and beyond, and on projections of future key policy and economic variables. These caveats, and the limitations of the forecasting approach, should be kept in mind in the discussion that follows.

These forecasts will be used to address the question of whether, and under what economic circumstances, future NPS enlistment goals are likely to be attained. For the Naval Reserve, the institutional changes noted previously suggest that SAM enlistments will probably be demand constrained, at least in the short run. The issue we will pursue here is whether SAM supply constraints are likely in the outyears as economic conditions change and the number of recruiters declines (by assumption). For the Army Reserve, we will be interested in the circumstances under which the large projected FY 1990 increase in NPS enlistments goals is attainable. A similar issue arises in the Army National Guard where small, but gradual, increases in both NPS and PS goals are projected over the FY 1988 to FY 1994 period.

Figures 1 through 5 are graphs of NPS forecasts under two alternative recruiter assumptions, superimposed on the reserve component's NPS enlisted requirements for FY 1988 through FY 1994. Comparisons of the forecasts and requirements provide a rough feel for the attainability of enlisted "goals" over a variety of recruiter assumptions and economic scenarios. The top panels in the first four figures are OLS forecasts for the Army Reserve and the Army National Guard, made under economic Scenario I or Scenario II. The bottom panels are IV forecasts that take into account the number of PS enlistments. Recall that the latter forecasts assume that PS enlisted "goals" are exactly attained each year. Figure 5 presents OLS and IV forecasts for the Naval Reserve's Sea and Air Mariner program. Given the projected downsizing of the SAM program, only the forecasts based on projected declines in SAM recruiters are reported. For this figure, the top panel combines OLS and IV forecasts for Scenario I; Scenario II forecasts are shown in the bottom panel.

Figure 1 shows Army Reserve NPS enlistment forecasts for Scenario I. First, the OLS forecasts in the top panel assume a constant number of recruiters (assumption 1). Enlistments decline throughout the forecast period. Forecasted declines in the first two years are primarily the consequence of dramatic declines in unemployment rates—from 7.1 to 5.5 percent between fourth quarter FY 1986 to FY 1988. Beyond FY 1988, most of the decline (about 1200 fewer recruits by FY 1994) is attributable primarily to a shrinking youth pool since both recruiter numbers and unemployment rates are being held constant. When the numbers of recruiters are increased under assumption 2—from 1491 to 1728 recruiters between FY 1987 and FY 1990, and to 1750 recruiters by FY 1994—we forecast a rise in NPS enlistments between FY 1989 and FY 1991. Subsequently, NPS enlistments decline by about 1200 recruits between FY 1991 and FY 1994, suggesting that the assumed increase of 22 Army Reserve recruiters over this latter period is insufficient to offset the effects of a shrinking QMA youth population.

Our forecasts are affected in several ways by incorporating recruiter behavior into the model. Compare OLS and IV forecasts made under the constant recruiter assumption. The IV forecasts in the bottom panel of Fig. 1 show a level increase of about 1800 NPS recruits between FY 1989 and FY 1990, a change that persists (with variations) until the end of the forecast period. This is the

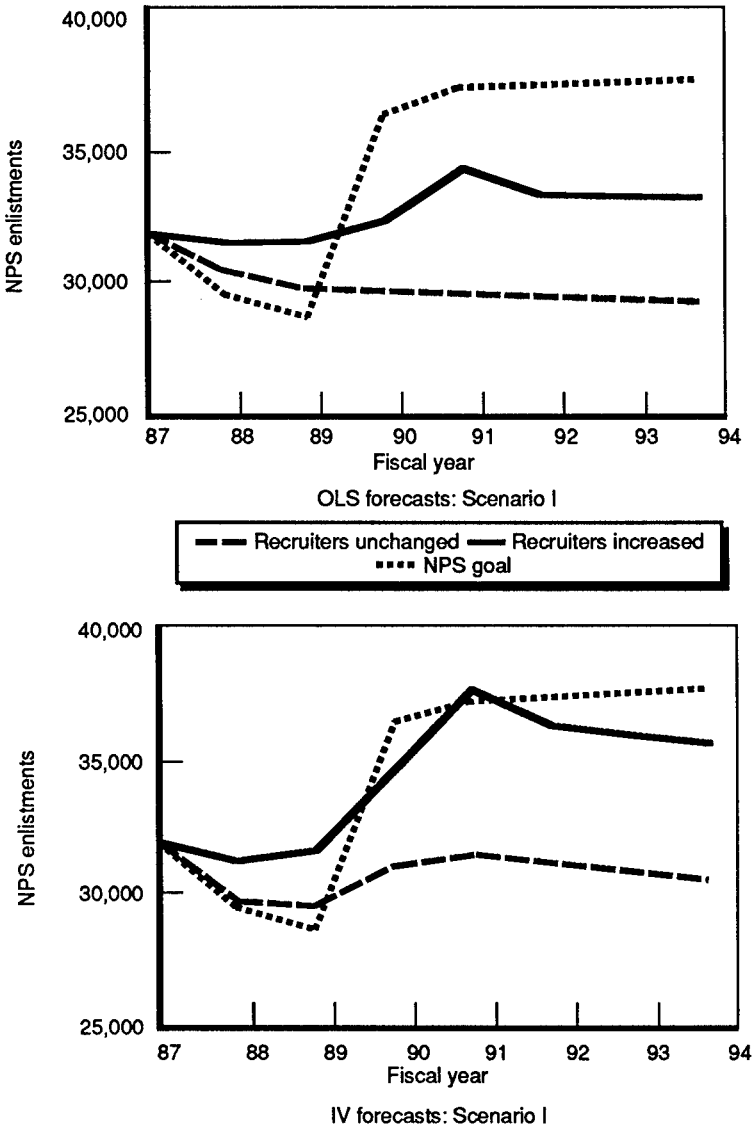

Fig. 1—Army Reserve forecasts: Scenario I

result of projected reductions in PS requirements, from 45,000 in FY 1989 to 39,000 in 1990, reductions that raise NPS enlistments by diverting recruiter effort to NPS recruiting. The reduction in PS goals interacts with increased numbers of recruiters (assumption 2) to produce an annual increase of 3500 NPS recruits between FY 1989 and FY 1990. Comparisons of IV forecasts made under assumptions 1 and 2 suggest that this 3500 increase is attributable about equally to reduced PS goals (1800 more recruits) and to increased numbers of recruiters (1700 more recruits).

Figure 1 also shows that Army Reserve NPS enlistment goals from FY 1990 on are probably not attainable (except for one year—FY 1991) under Scenario I, even with "reasonable" increases in Army Reserve recruiters. The projected expansion in the size of the recruiter force is not inconsequential: over 80 recruiters between FY 1987 and FY 1989 (from 1491 to 1571), and another 150 recruiters by FY 1990. In the OLS forecasts, projected shortfalls—the difference between reported NPS goals and forecasted enlistments—of between 3000 and 4000 recruits are forecast for FY 1990 and beyond. IV forecasts, on the other hand, project much smaller shortfalls of under 2000 NPS recruits in large part because of reduced PS goals.

The recruiting picture for the Army Reserve is much improved under a more recessionary environment (see Fig. 2). In Scenario II, we project a two-point rise in the unemployment rate from FY 1989 to FY 1994, with the rate of unemployment returning (roughly) to levels prevailing in FY 1986 (see Table B.2). Figure 2 makes several points. First, the enlistment effects of unemployment are sufficiently large to completely offset the effects of declining youth population size, even with a constant number of recruiters. However, and more importantly, the constant recruiter assumption is inadequate for attaining future NPS enlisted goals. Second, NPS goals appear more attainable with increases in the number of recruiters (assumption 2). In OLS forecasts, NPS enlistments approach reported goals by FY 1991, with relatively small shortfalls of under 500 recruits; the IV forecasts exceed NPS goals by FY 1991.

Figures 3 and 4 present NPS enlistment forecasts for the Army National Guard. These forecasts are based on the assumption that the Army Reserve and Army National Guard have similar population supply elasticities. Recall that negative population elasticities were found for this reserve component; using them

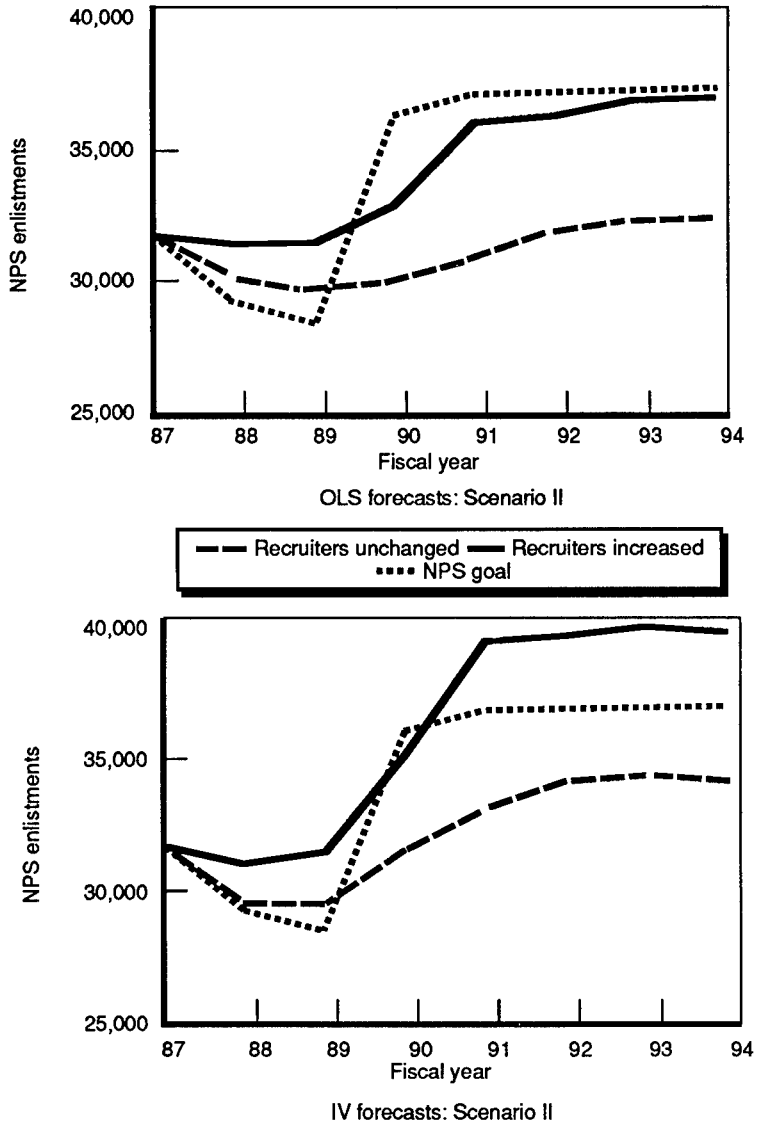

Fig. 2—Army Reserve forecasts: Scenario II

would have resulted in forecasts of rising Army National Guard enlistments in the face of a declining QMA youth pool. The falling trend in Army National Guard NPS enlistments shown in Fig. 3 is more believable. Based on the OLS forecasts, we project a decline in the number of NPS recruits—about 800—between FY 1989 and FY 1994, primarily as a consequence of declining youth cohort size. In Scenario I, a proportionate increase in the number of recruiters just offsets the effects of declining youth population size, despite a rather modest increase in the recruiter force (just over 100 recruiters are added over the forecast period because of the low growth in NPS goals).

In Figure 3, the OLS and IV forecasts of NPS enlistments are invariably below projected goals over the entire forecast period. We interpret this to mean that NPS goals in the Army National Guard do not appear attainable under the low aggregate unemployment rates projected for Scenario I. With the more recessionary conditions envisaged in Scenario II (see Fig. 4), both OLS and IV forecasts of NPS enlistments exceed goals by FY 1991 or FY 1992.

Figure 5 shows our NPS forecasts for the Naval Reserve SAM program. We do not report forecasts for the constant recruiter assumption (1), since it flies in the face of the FY 1988 decision to cut back on the size of the Sea and Air Mariner program. Only forecasts based on a proportional reduction in SAM recruiters—by about 290 recruiters over this period—are shown for Scenarios I and II. Earlier, we had raised the issue about whether the SAM program would become supply-constrained again in the future, as economic conditions change and the number of recruiters declines. As Fig. 5 clearly shows, the answer is probably not. In all years, SAM enlistments are forecasted to exceed goals, regardless of the forecasting model used (OLS or IV) or assumptions made about the future path of the economy (Scenarios I and II).

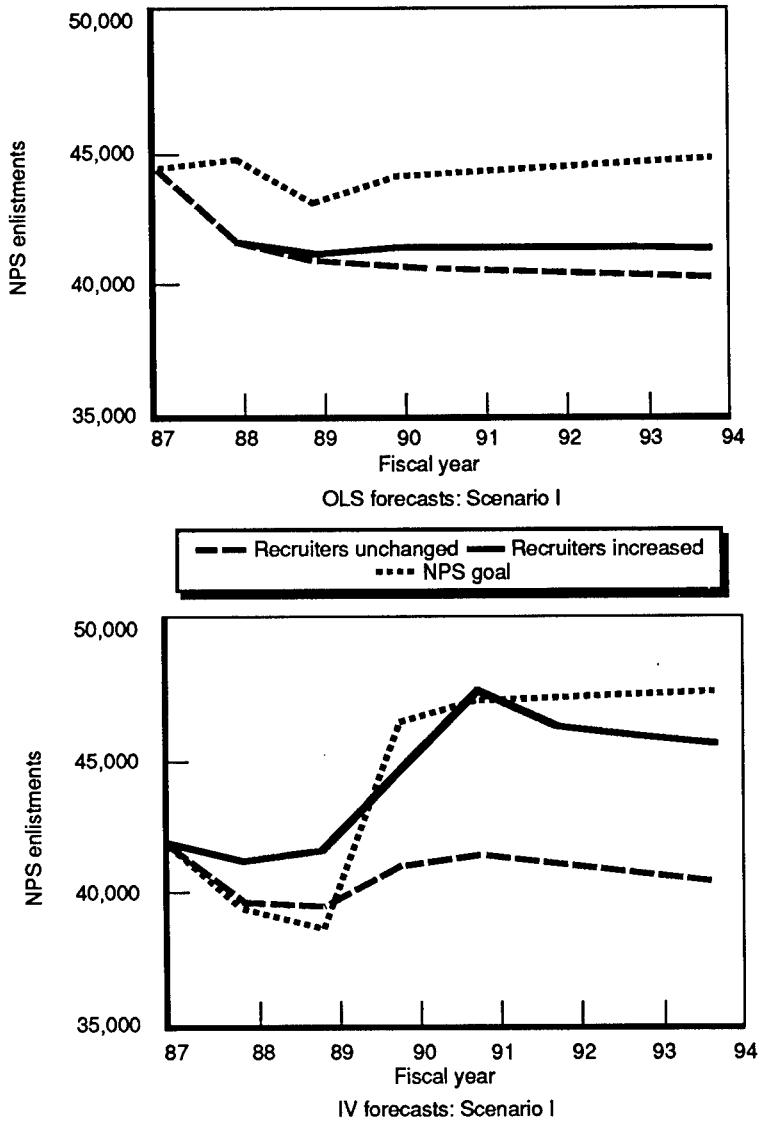

Fig. 3—Army National Guard forecasts: Scenario I

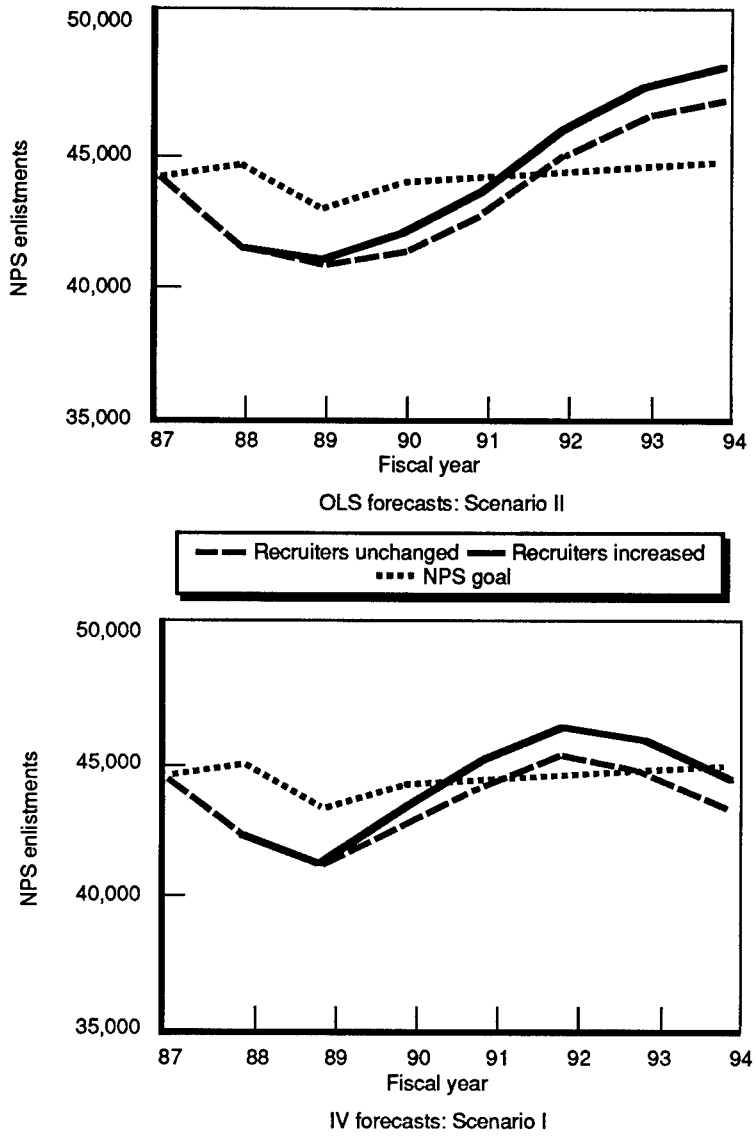

Fig. 4—Army National Guard forecasts: Scenario II

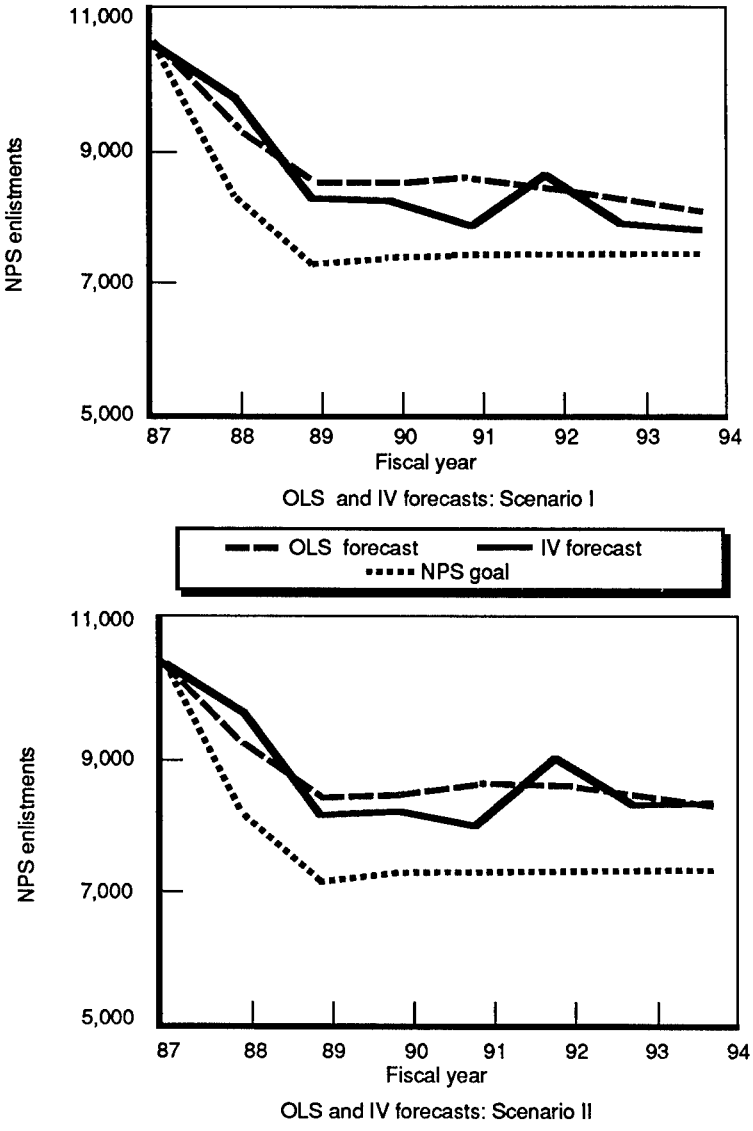

Fig. 5—Naval Reserve forecasts: Scenarios I and II

VI. CONCLUSIONS

The analysis in this report was motivated by the paucity of supply research on the Selected Reserve. Extant studies of reserve enlistments have been limited by poor data and lack of information on recruiters and goals. Perforce, military personnel policymakers have often had to rely on supply elasticities estimated for the active components despite questions about their applicability to the Selected Reserve. The research reported here takes the first step toward providing supply estimates relevant to the Selected Reserve. Estimated enlisted supply models for three reserve components sought to incorporate the effects of recruiter behavior and intercomponent competition for NPS recruits. The supply estimates were used to develop forecasts of NPS reserve enlistments for alternative economic scenarios between FY 1987 and FY 1994.

An unexpected finding of the research was the similarity between supply elasticities estimated for the Selected Reserve and those reported in active duty supply studies. Different supply effects might have been expected, given the local labor market orientation of recruiting in the Selected Reserve. By implication, reserve enlistment projections based on active duty supply elasticities that policymakers have typically relied upon are not likely to be too far off the mark. However, supply elasticities exhibit enough systematic variation both within and across reserve components that policymakers might want more precise supply estimates. This will require estimation of separate supply models for each reserve component, much like those attempted in this report.

The empirical results highlight the importance of incorporating the effects of recruiter behavior in supply models which, otherwise, are potentially biased. Controlling for the allocation of recruiter effort between PS and NPS enlistments generally yielded larger recruiter elasticities, as predicted. For the Army Reserve, a negative tradeoff of between three to four PS enlistments for one NPS enlistment was found. The corresponding PS tradeoff for high quality NPS males was about five to one, suggesting that they are on average about five times more difficult to recruit as PS enlistees. However, the PS-NPS tradeoff was estimated to be

positive for the Army National Guard and the Naval Reserve, and further research will be needed to better understand these anomalous results. The tradeoffs estimated for the Army Reserve, while tentative, are potentially useful in developing PS and NPS missions that reflect the relative difficulty of recruiting in these different markets.

We also studied the effects of competition on a reserve component's NPS enlistments. The policy issue is whether a reserve component's NPS recruiting is hampered or facilitated by competition from other active and reserve components. This issue takes on added significance when we consider the Selected Reserve's recent efforts to increase high quality male recruiting at a time when the active duty components are strenuously doing the same. In general, we find little evidence of deleterious effects from intercomponent competition. On the contrary, increased recruiting by others tends to enhance each reserve component's recruiting, possibly because spillovers from (for example) joint-service advertising more than offset any negative impact of competition. The one exception was the Naval Reserve, where competition had a large negative impact on SAM recruiting, especially of high quality NPS males. Part of the reason for these estimated effects may lie in the rapid expansion of the SAM program at a time of falling unemployment and tight labor markets.

Forecasts of NPS enlistments were made for alternative macroeconomic scenarios and assumptions about the future growth in the size of the recruiter force. In one scenario, unemployment rates were assumed to remain at current low levels over the forecast period. A second, more recessionary, scenario incorporated the wage effects of declining youth cohort size. Holding the number of recruiters fixed at FY 1986 levels, the first scenario yielded forecasts of falling enlistment rates because of the shrinking youth pool; these population effects were completely offset in the two Army components by the (assumed) rise in unemployment rates. The wage effects of shrinking cohort size are large, but much of the impact on enlistments will probably not be felt until after FY 1992. NPS forecasts were also developed that take into account the effects of PS enlistments. When future changes in PS goals are large, as is the case in the Army Reserve, they can make a sizable difference in forecasted NPS enlistments. Compared to the first model, reduced PS

requirements from FY 1990 on add almost 1800 recruits to our NPS forecasts for the Army Reserve.

Forecasts were also used to assess the attainability of NPS enlistment goals reported in the DoD's most recent five-year manpower plans, developed as part of the Program Objective Memorandum. Clearly, any goal is attainable if sufficient resources are devoted to it; however, in an era of tight budgets and finite resources, the ability of reserve components to increase their recruiting force is limited. We therefore compared the NPS goals to enlistments forecasted for each reserve component under alternative economic scenarios and "reasonable" recruiter growth assumptions.

Recognizing the limitations of the forecasting model, several tentative conclusions were drawn from comparisons of the forecasts and reported NPS goals. First, Army Reserve NPS goals, and in particular the FY 1989–FY 1990 increase in NPS enlisted requirements of 8000, do not appear attainable under Scenario I, even with a significant expansion of the recruiter force proportional to growth in enlistment goals. Only under the more recessionary scenario are NPS goals attainable. Second, NPS goals in the Army National Guard do not appear attainable under Scenario I assumptions, even with reasonable increases in the projected recruiter force. Only under Scenario II are NPS goals attainable, and then probably only after FY 1990. Our forecasts for the Naval Reserve, based on a reduction in the number of SAM recruiters proportional to NPS goals, suggest that recruiting for the SAM program is likely to be demand-constrained into the forseeable future.

Appendix A
THE DATA BASE

This appendix describes the data base on which the analysis in this report is based. Data were assembled from a number of sources: active and reserve enlistment counts from the Defense Manpower Data Center (DMDC), recruiter and goal figures from the recruiting commands of each reserve component, and local labor market information from the Current Population Survey (CPS) and the Bureau of Labor Statistics (BLS). Together, these series provide a rich source of cross-sectional and time-series data for the study of NPS reserve enlistments. We describe these data and their limitations below.

RESERVE AND ACTIVE ENLISTMENT CONTRACTS

Aggregate figures on enlistments into each of the reserve and active components between FY 1981 and FY 1986 were produced by DMDC for this project. For each quarter, there are counts of the number of non-prior service (NPS) and prior service (PS) enlistments, cross-classified by Armed Forces Qualification Test (AFQT) categories (Cat I through IV), by educational attainment (non-high school graduates, seniors, and high school graduates), by age category (17 to 22 years and greater than 22 years), by sex, and by 65 Military Entrance Processing Stations (MEPSs). For reasons to be discussed below, the Marine Corps Reserve was excluded from the sample. All other selected reserve components, however, are represented in the data, including the Army Reserve, the Army National Guard, the Naval Reserve, the Air Force Reserve, and the Air National Guard.

Algorithms were developed to address missing data problems in the reserve enlistment contracts data. The Reserve Components Common Personnel Data System (RCCPDS) is the official DoD data source on the reserves. While RCCPDS's coverage has improved in recent years, there are gaps in the historical series, especially in the reporting of critical data elements such as AFQT, schooling attainment, and geographic location. Rather than drop missing data (and artificially lowering enlistment

counts), separate algorithms were used for each reserve component to impute missing information. We assume that missing data elements are randomly distributed. This allows us to impute information to them on the basis of existing (nonmissing) conditional distributions of these variables. In the few cases where no information (other than accession date) is known, the counts are allocated across all cells in proportion to their share of that component's total accessions in that quarter. These imputation procedures ensure that total enlistment counts for each reserve component in our data sum up to the aggregate counts reported by DMDC.

The only reserve component for which this did not work was the Marine Corps Reserve. Missing data were particularly acute in this reserve component. For example, no information on geographic location or AFQT was reported in the first few years of the sample period. Given the study's focus on MEPS as the unit of analysis, a decision was made to drop the Marine Corps Reserve entirely.

In creating the PS reserve accession figures, pains were taken to eliminate double-counting. The status of reservists failing to show up for drills are, in most cases, automatically changed from Selected Reserve (SR) to Individual Ready Reserve (IRR), and revised again upon their return to drill status. Our examination of individual records indicated that multiple SR/IRR status changes were common. Since the transaction/gain files are used to derive prior service enlistment counts, care must be taken to distinguish between "real" enlistments (which require recruiter effort) and these SR/IRR status changes (which do not). We addressed this problem by sorting all transactions by social security number (SSN) and counting only the first occurrence of a unique social security number as a PS gain.

Naval Reserve NPS gains into the Sea and Air Mariner (SAM) program cannot be accurately derived from RCCPDS. In fact, as it turns out, many SAMs are incorrectly coded as being prior service gains. In this study, we relied instead upon an earlier research effort by the Center for Naval Analyses (CNA) that identified all individuals who enlisted in the SAM program between FY 1983 and FY 1986. Using the list of SAM social security numbers provided by CNA, a new (and presumably more accurate) data series on NPS (and PS) counts was created through a match of social security numbers in RCCPDS. However, the SAM series is probably reliable only up to the third quarter of FY

1986. The small number of SAMs in the fourth quarter of that year leads us to suspect that not all SAMs have been counted.

RESERVE RECRUITER AND GOAL DATA

With one exception, data on reserve recruiters and recruiting goals were collected directly from the recruiting commands of each component. Much of this information (especially the historical series) is not centralized or collected in any systematic fashion. Moreover, the data were often in hard-copy form and had to be manually key-punched or optically scanned to convert to machine-readable form for analysis. As shown in Table A.1, the recruiter data for most components spanned the entire sample period between FY 1981 and FY 1986; quota data, however, varied considerably across reserve components both in detail and in the time period covered.

The Naval Reserve's recruiter and goal data merit further mention. They were developed by CNA from the RESULTS module of the Reserve Training Support System and from another data base (PRIDE-R) that contains information on SAMs. Individual recruit files contain the SSN of the recruiter and the command, unit identification code, and state location of units receiving the gain. The number of recruiters in each command is calculated as the number in each month that had at least one enlistment credited to them. This may result in some understatement since recruiters are counted only if they enlist someone. However, there is no reason to believe that this understatement is systematically related to either the command or to the time period. Recruiting goals were obtained from COMNAVRESFOR, Code 922. A more detailed discussion of this data base is contained in Kostiuk and Grogan (1987).

To obtain counts of recruiters and goals by MEPSs, crosswalks were developed between MEPSs and the areas covered by the recruiting commands of each reserve component. This involved, for instance, developing a correspondence between MEPSs and states (Army National Guard and Air National Guard), MEPSs and battalions (Army Reserve), MEPSs and Navy Recruiting Centers or NRC (Naval Reserve), and MEPSs and operating locations (Air Force Reserve). These crosswalks were based on a FIPS-MEPS translation developed from the 1980 Population Census, using population as weights.

Table A.1

CHARACTERISTICS OF THE RECRUITER AND GOAL DATA

Reserve Component	Data Type	Period	Detail
Army Reserve	Recruiter	1981–1986	
	Goal	1981–1986	Sex, HQ/LQ, NPS/PS
Army National Guard	Recruiter	1981–1986	
	Goal	1984–1986	NPS/PS
Naval Reserve	Recruiter	1982–1986	SR SAM
	Goal	1983–1986	Total goal: SR/SAM
Air Force Reserve	Recruiter	1981–1986	
	Goal	1981–1986	Total goal
Air National Guard	Recruiter	1981–1986	No time variation
	Goal	n.a.	n.a.

NOTE: HQ = high quality recruit; NPS = non-prior service
LQ = low quality recruit; PS = prior service
SR = Selected Reserve; SAM = Sea and Air Mariner

LOCAL LABOR MARKET DATA

The local labor market data were developed from two sources: the March demographic file of the Current Population Survey, and the Bureau of Labor Statistics publication, *Employment and Earnings*. Both data sources contain state-level information on a variety of local labor market characteristics, including unemployment, hours worked per week, and hourly earnings. There are advantages and disadvantages in both data sources. The BLS provides monthly series by state on variables such as the average hourly earnings of production workers in manufacturing, the monthly unemployment rate, and hours worked per week. In contrast, the CPS can be used to calculate similar kinds of information for the youth population, as well as other attributes such as family income, the proportion of youth living in a SMSA, and the proportion of youth working. The drawback is that only annual figures are available (no quarterly variation over the year is possible). As before, the BLS and CPS state data are converted into MEPS-based data, based on the crosswalks described above. These data series were then smoothed using a five-quarter moving average.

THE QMA YOUTH POPULATION

Estimates of the qualified, military-available (QMA) youth population were derived from two data sources: the 1980 Population Census and the 1979 National Longitudinal Survey (NLS) of Youth. The variable was created in two steps.

The 1980 Population Census provided estimates of the size of the male youth population. Using the five percent public-use file, we first selected a sample of males, age 17 to 22 years without any physical handicaps that would limit work or (presumably) military enlistment. An algorithm was then developed to distribute these counts from counties (or county groups) to MEPSs. For reasons that become apparent, the MEPS counts included information on individual characteristics—age, educational attainment, and race/ethnicity. The 1980 Population Census was then "aged" to get counts of the youth population over the interval of the analysis—FY 1981 to FY 1986—and beyond—to FY 1994—for the forecasting exercise in Sec. IV. Projections of youth population size by MEPSs depend upon several assumptions: first, that schooling continuation rates remain unchanged from 1980 levels; second, that current age-specific mortality rates (used in aging the Population Census) persist into the future; and finally, that there are no dramatic regional shifts in youth migration patterns.

The second step was used to determine the size of the QMA youth pool. This involved predictions of AFQT distributions in the projected youth population in each local labor market. Using a sample of NPS youth from the NLS who took the ASVAB in 1980,[1] we first estimated an ordered probit model relating AFQT category to several individual and locational variables—age, education, race/ethnicity, four broad census regions, and their interactions. The methodology and ordered probit results are available on request from the author. From the estimated parameters, we can calculate the conditional probabilities of individuals with a vector of X individual and locational attributes falling into each of the five AFQT categories. These conditional probabilities are the basis for our estimates of the QMA male youth population—the physically able group of youth predicted to attain at least a Category IV score on the AFQT. The high quality QMA

[1]The administration of the Armed Services Vocational Aptitude Battery to the NLS sample was sponsored by the Department of Defense and the Department of Labor. The results of that study are described in Department of Defense, 1982.

population is simply that group of seniors or high school graduates (observed) with a (predicted) minimum Category III AFQT score.

Appendix B
SUPPORTING TABLES

Table B.1

AGGREGATE DATA USED IN FORECASTING ENLISTMENTS

Fiscal Year	Youth Pool (1000s)	HQ Youth Pool[a] (1000s)	Scenario I		Scenario II	
			Unemployment Rate	Youth Wage	Unemployment Rate	Youth Wage
87	9,622	6,150	6.5	4.80	6.5	4.81
88	9,522	6,051	5.6	4.80	5.6	4.84
89	9,337	5,969	5.4	4.80	5.5	4.77
90	9,167	5,877	5.4	4.80	5.9	4.71
91	8,975	5,774	5.4	4.80	6.5	4.70
92	8,790	5,632	5.4	4.80	7.2	4.77
93	8,528	5,442	5.5	4.80	7.4	4.93
94	8,259	5,235	5.5	4.80	7.5	5.08

[a]HQ Youth Pool = high school graduates with AFQT Categories I–III.

Table B.2

ACTUAL ENLISTMENTS AND PROJECTED ENLISTED REQUIREMENTS
(In 1000s)

Fiscal Year	Non-Prior Service					Prior Service				
	ANG	AR	SAM	AFG	AFR	ANG	AR	NR	AFG	AFR
87	47.0	31.0	10.2	5.1	3.4	34.0	47.0	23.6	6.2	10.9
88	44.3	29.4	8.0	5.3	3.4	37.3	48.2	26.2	7.4	10.5
89	42.6	28.6	7.0	5.4	3.5	34.8	45.8	21.9	6.3	11.3
90	43.5	36.4	7.1	5.4	3.5	35.6	39.5	21.4	6.6	10.9
91	43.7	37.3	7.1	5.4	3.6	35.8	37.4	18.3	6.1	10.9
92	43.9	37.4	7.1	5.4	3.6	35.9	37.4	23.1	6.4	10.9
93	44.0	37.5	7.1	5.4	3.8	36.0	37.5	18.9	7.2	10.9
94	44.2	37.6	7.1	5.4	3.8	36.2	37.5	18.9	7.2	10.9

NOTE: ANG = Army National Guard
AR = Army Reserve
SAM = Naval Reserve Sea and Air Mariner
AFG = Air National Guard
AFR = Air Force Reserve
NR = Naval Reserve

Table B.3

ALTERNATIVE ASSUMPTIONS ABOUT NUMBERS OF RECRUITERS

Fiscal Year	Number of Recruiters at FY 1986 Levels[a]			Proportional Change in Number of Recruiters[b]		
	Army Reserve	Army National Guard	Naval Reserve (SAM)	Army Reserve	Army National Guard	Naval Reserve (SAM)
87	1491	2363	952	1491	2363	952
88	1491	2363	952	1571	2363	746
89	1491	2363	952	1571	2387	653
90	1491	2363	952	1728	2413	663
91	1491	2363	952	1738	2424	663
92	1491	2363	952	1742	2436	663
93	1491	2363	952	1747	2441	663
94	1491	2363	952	1750	2453	663

[a]Number of production recruiters in the last quarter of FY 1986 of our data set.

[b]Except for the SAM program, number of recruiters assumed to (1) rise in proportion to the weighted sum of NPS and PS goals, with (2) no decline in recruiters permitted. See text for a more detailed discussion.

Table B.4

FORECASTS OF NPS MALE AND FEMALE ENLISTMENTS FY 1987–FY 1994: REDUCED-FORM OLS MODEL

Fiscal Year	Number of Recruiters Held at FY 1986 Levels			Proportional Change in Number of Recruiters		
	Army Reserve	Army National Guard	Naval Reserve (SAM)	Army Reserve	Army National Guard	Naval Reserve (SAM)
Stationary, Scenario I						
87	33,839	49,604	9,703	33,839	49,604	9,703
88	32,145	46,698	9,470	33,538	46,698	8,617
89	31,533	45,721	9,288	33,478	45,934	7,791
90	31,410	45,543	9,159	34,384	46,239	7,772
91	31,270	45,340	9,013	36,453	46,272	7,852
92	31,132	45,141	8,872	35,370	46,146	7,712
93	31,061	45,083	8,685	35,323	46,196	7,549
94	30,931	44,908	8,483	35,243	46,108	7,373
Economic Slowdown/Cohort Wage, Scenario II						
87	33,842	49,615	9,706	33,842	49,615	9,706
88	32,158	46,811	9,475	33,552	46,811	8,621
89	31,654	45,836	9,301	33,607	46,050	7,802
90	32,081	46,345	9,224	35,123	47,054	7,828
91	32,958	47,886	9,176	38,421	48,871	7,994
92	34,073	50,251	9,153	38,711	51,371	7,956
93	34,616	51,840	9,019	39,365	53,120	7,839
94	34,687	52,655	8,835	39,523	54,062	7,679

Table B.5

FORECASTS OF NPS MALE AND FEMALE ENLISTMENTS FY 1987–FY 1994

Fiscal Year	Number of Recruiters Held at FY 1986 Levels			Proportional Change in Number of Recruiters		
	Army Reserve	Army National Guard	Naval Reserve (SAM)	Army Reserve	Army National Guard	Naval Reserve (SAM)
Stationary, Scenario I						
87	36,701	42,066	10,031	36,701	42,066	10,031
88	34,186	40,242	10,143	35,973	40,242	9,291
89	33,999	38,437	9,230	36,443	38,633	7,836
90	35,784	38,350	9,082	39,946	38,977	7,796
91	36,228	38,038	8,420	43,367	38,868	7,408
92	35,883	37,704	9,266	41,813	38,598	8,135
93	35,524	37,434	8,423	41,450	38,415	7,396
94	35,105	37,056	8,349	41,055	38,109	7,330
Economic Slowdown/Cohort Wage, Scenario II						
87	36,702	42,054	10,037	36,702	42,054	10,037
88	34,191	40,066	10,154	35,978	40,066	9,301
89	34,162	38,877	9,255	36,617	39,075	7,857
90	36,728	40,382	9,203	41,009	41,043	7,900
91	38,577	41,881	8,709	46,179	42,796	7,663
92	39,879	42,868	9,837	46,470	43,883	8,637
93	40,230	42,256	9,062	46,941	43,363	7,956
94	39,979	40,943	9,038	46,756	42,106	7,936

Table B.6

FORECASTS OF HIGH QUALITY MALE RESERVE ENLISTMENTS
FY 1987–FY 1994

Fiscal Year	Number of Recruiters Held at FY 1986 Levels			Proportional Change in Number of Recruiters		
	Army Reserve	Army National Guard	Naval Reserve (SAM)	Army Reserve	Army National Guard	Naval Reserve (SAM)
Stationary, Scenario I						
87	17,478	31,205	5,135	17,478	31,205	5,135
88	16,803	29,413	4,925	17,748	29,413	4,505
89	16,608	28,916	4,831	17,935	29,078	4,091
90	16,608	28,916	4,768	18,687	29,443	4,083
91	16,608	28,916	4,698	20,228	29,623	4,124
92	16,608	28,916	4,602	19,575	29,683	4,031
93	16,664	29,067	4,483	19,665	29,922	3,927
94	16,697	29,152	4,346	19,754	30,080	3,808
Economic Slowdown/Cohort Wage, Scenario II						
87	17,481	31,200	5,135	17,481	31,200	5,135
88	16,756	29,456	4,926	17,698	29,456	4,505
89	16,725	29,002	4,843	18,061	29,164	4,101
90	17,148	29,514	4,833	19,298	30,052	4,139
91	17,618	30,666	4,852	21,458	31,416	4,259
92	17,939	32,275	4,856	21,144	33,132	4,254
93	17,900	33,394	4,773	21,124	34,376	4,182
94	17,661	34,025	4,641	20,894	35,108	4,065

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